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BEFORE THE ARIZONA CORPORATION COMMISSION

COMMISSIONERS

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2007 MAR 23 P 3: 54

AZ CORP COMMISSION
DOCUMENT CONTROL

IN THE MATTER OF THE APPLICATION OF) DOCKET NO. G-04204A-06-0463
UNS GAS, INC. FOR THE ESTABLISHMENT OF)
JUST AND REASONABLE RATES AND)
CHARGES DESIGNED TO REALIZE A)
REASONABLE RATE OF RETURN ON THE)
FAIR VALUE OF THE PROPERTIES OF UNS)
GAS, INC. DEVOTED TO ITS OPERATIONS)
THROUGHOUT THE STATE OF ARIZONA.)

Arizona Corporation Commission
DOCKETED

MAR 23 2007

DOCKETED BY

Jhr


IN THE MATTER OF THE APPLICATION OF) DOCKET NO. G-04204A-06-0013
UNS GAS, INC. TO REVIEW AND REVISE ITS)
PURCHASED GAS ADJUSTOR.)

IN THE MATTER OF THE INQUIRY INTO THE) DOCKET NO. G-04204A-05-0831
PRUDENCE OF THE GAS PROCUREMENT)
PRACTICES OF UNS GAS, INC.) NOTICE OF FILING OF
SUPPLEMENTAL EXHIBIT TO
THE REBUTTAL TESTIMONY OF
DENISE A. SMITH

UNS Gas, Inc. ("UNS Gas"), through undersigned counsel, hereby files Exhibit DAS-3 to
Denise A. Smith's UNS Gas Rebuttal Testimony, filed on March 16, 2007. This supplemental
exhibit contains UNS Gas' proposed Demand-Side Management ("DSM") portfolio and is being
filed for informational purposes so that Staff and others may better evaluate UNS Gas' DSM
programs in detail. UNS Gas will also file this portfolio as part of a separate application for
approval.

1 RESPECTFULLY SUBMITTED this 23rd day of March 2007.

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EXHIBIT

DAS-3

UNS Gas
Demand Side Management
Program Portfolio Plan
2008-2012

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Attachments:

Low Income Weatherization Program Description	Attachment 1
Energy Smart Home Program (Residential New Construction Program) Description	Attachment 2
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C&I Facilities Gas Efficiency Program Description	Attachment 4

1. Introduction

UNSG Gas ("UNSG") is requesting approval of the portfolio of DSM programs presented in this plan. This portfolio plan provides an overview of DSM programs that UNSG proposes to implement to provide savings and net benefits for UNSG customers.

2. DSM Portfolio Performance Costs, Savings and Net Benefits

UNSG proposes to implement a portfolio of DSM programs designed to reduce the use of energy by encouraging its customers to implement certain energy-efficiency products, services or practices. The proposed programs are designed to influence residential and non-residential customers to adopt energy efficiency measures through a combination of rebates, technical assistance and training, and consumer education. While the focus of the programs is on reducing the use of natural gas, some of the programs will likely result in electric energy savings as well and those savings have also been estimated and included in the analysis of the programs.

Exhibit 1 summarizes the proposed budget and expected energy savings as a result of program activities from 2008-2012. Exhibit 2 summarizes program net benefits of the programs from 2008-2012 from the perspectives of the Total Resource Cost ("TRC") and the Societal Cost ("SC") tests. These tests are described in more detail below.

Exhibit 1
DSM Portfolio Budgets and Estimated Savings 2008-2012

Program Budget 2008-2012	Annual Therm Savings	Non- coincident Peak Demand Savings (MW)	Coincident Peak Demand Savings (MW)	Annual MWH Savings
\$5,486,461	5,966,502	5.2	4.4	3,109

Exhibit 2
DSM Portfolio Net Benefits 2008-2012

Total Resource Cost Test Portfolio Benefits	\$39,579,987
Total Resource Cost Portfolio Costs	\$24,747,206
Total Resource Cost Portfolio Net Benefits	\$14,832,781
Societal Cost Test Portfolio Benefits	\$49,955,589
Societal Cost Test Portfolio Costs	\$24,747,206
Societal Cost Test Portfolio Net Benefits	\$25,208,383
Total Resource Cost Test – Portfolio Level	1.60
Total Societal Cost Test – Portfolio Level	2.02

Total Net Benefits are equal to Total Societal Benefits minus Total Societal Costs. Total Societal Benefits are equal to the avoided costs of demand and energy savings over the life of the efficiency measures, and Total Societal Costs include all program costs including the cost of program administration, and measurement, evaluation and research.

3. Description of Proposed Programs

The program portfolio includes a range of programs designed to provide all of UNSG's customer segments with opportunities to reduce demand, save energy and reduce energy costs. The programs are designed to provide options for improving the energy efficiency of existing residential homes, residential new construction projects, residential low-income homes, commercial and industrial ("C&I") Gas Efficiency, and non-residential new construction and renovation projects.

This section includes a brief description of each proposed DSM program. Detailed program descriptions are provided in the Attachments hereto including information about (1) program concepts; (2) target markets; (3) baseline conditions; (4) customer eligibility; (5) program rationales; (6) program objectives; (7) products and services provided; (8) delivery strategy and administration; (9) marketing and communications; (10) implementation schedules; (11) monitoring and evaluation plans; (12) program costs; (13) estimated energy savings; and (14) program cost effectiveness. Exhibit 3 shows the list of programs included in this plan:

Exhibit 3	
Listing of Programs Included in the Portfolio Plan	
Residential Efficiency Programs	
Low Income Weatherization	
Energy Smart Homes Program	
Efficient Home Heating Program	
Commercial & Industrial Efficiency Programs	
C&I Facilities Gas Efficiency Program	

3.1 Residential Efficiency Programs

Proposed residential efficiency programs included in the DSM portfolio are described below.

Low Income Weatherization Program

This portfolio plan proposes an expansion and modification of the current Low Income Weatherization ("LIW") program. The LIW program will continue to provide qualifying residential low income customers with funding assistance for the installation of measures that improve the energy-efficiency of their homes. However, the new program will offer an expanded set of efficiency measures and services. The primary goal of the LIW program is to provide financial assistance to install measures that improve comfort and reduce overall energy consumption for eligible customers. Steps taken through this program will reduce electric and gas bills and provide eligible customers with more disposable income for other needs.

The LIW Program is fuel neutral in that weatherization measures approved for the homes will result in a reduction of both electric and gas consumption. Most homes in this program have either no cooling because of climate conditions or they have evaporative cooling and gas or electric space heating; therefore, the program is not expected to significantly reduce summer peak load but it will be an effective program in reducing consumption of natural gas. The main social benefits of the program will be the reduction of gas and electric heating bills for low-income customers. UNSG has not formally tracked

program activities in the past but will develop a tracking system for the new program to quantify measures installed, energy savings realized, and report on program achievements.

Changes to the LIW program include: (1) increased funding to weatherization agencies; (2) an expanded list of weatherization measures allowed in each home; (3) an increased spending limit on each home; (4) inclusion of compact fluorescent lighting ("CFL") and low-flow shower and faucet aerators to be installed in every low-income home that also qualifies for emergency repair funding; and (5) an increase in the reporting functions so agencies must report each measure installed in the homes. The new program will allow UNSG to calculate and verify energy and demand savings from the LIW program and report those savings in future years. However, this analysis does not include the positive and unquantifiable effects of leveraging federal and state funding for other improvements to the homes which further reduce energy consumption and improve occupant comfort and safety. For a detailed program description, see Attachment 1.

Energy Smart Home Program

The UNSG Energy Smart Homes ("ESH") program will emphasize the whole-house approach to improving health, safety, comfort, durability and energy efficiency. The program will promote homes that meet the 2006 Environmental Protection Agency /Department Of Energy ("EPA/DOE") Energy Star Home® performance requirements. To encourage program participation by builders, the program will provide incentives to home builders for each qualifying Energy Star Home®. Required on-site inspections and field testing of a random sample of homes to meet Energy Star Home® performance requirements will be conducted by third-party RESNET certified energy raters selected by each builder

Savings are based on heating, cooling and hot water energy use and are achieved through a combination of (1) building envelope upgrades; (2) high performance windows; (3) controlled air filtration; (4) upgraded heating and cooling systems; (5) tight duct systems; and (6) upgraded water heating equipment. New homes constructed through the program will be eligible to display the Energy Star Home® seal. The ESH program will also encourage builders to install Energy Star® labeled dishwashers, clothes washers and refrigerators.

Builders will sign on as an EPA/DOE Energy Star Home® partner and agree to adhere to all requirements of that program. UNSG will provide training and education about building science and the whole-house approach to building homes, marketing and builder incentives. The training and education will be offered to homebuyers, builders, sub-contractors and realtors/builder sales agents. Training is aimed at increasing the applied knowledge of building science and energy efficient building practices to transform the market and improve construction practices in the UNSG service territories. Educational and promotional pieces and design tools will assist builders and associated trade allies (architects and engineers, sub-contractors, etc.) with the construction standards that meet or exceed the ESH program standards. For a detailed program description, see Attachment 2.

Efficient Home Heating Program

The proposed Efficient Home Heating Program provides prescriptive incentives to encourage residential and multi-family homeowners to invest in energy-efficient gas-fueled furnaces with a 90 percent or greater Annual Fuel Utilization Efficiency ("AFUE") rating. UNSG will provide training, qualification and promotion for HVAC contractors who are knowledgeable and meet UNSG standards for the installation and operation of high-efficiency residential gas furnace systems. The program will be promoted to UNSG's residential customers, and will provide education for homeowners on the benefits of high-efficiency heating systems, and information on how to participate in the program. For a detailed program description, see Attachment 3.

3.2 Commercial & Industrial Efficiency Programs

The DSM Portfolio Plan will encourage the installation of energy efficient gas-fueled equipment in existing C&I facilities in UNSG's service region. The proposed program is described below.

C&I Gas Efficiency Program

The C&I Gas Efficiency Program provides prescriptive incentives to owners and operators of non-residential facilities for energy-efficiency improvements in gas-fueled systems and equipment. Specifically, the program provides incentives for high-efficiency space heating, service water heating, and commercial cooking equipment and systems. The program will be available to UNSG's existing non-residential gas customers, including schools and governmental buildings. The program will provide limited technical assistance and education for facility owners and operators on the benefits of high-efficiency equipment and systems, and how to participate in the program. For a detailed program description, see Attachment 4.

4. Budget

UNSG is proposing to spend a total of \$5.48 million dollars on energy-efficiency DSM programs collectively from program years 2008-2012.

The proposed budget maximizes the amount of program funds that go directly to customers through rebates and incentives, training and technical assistance, and consumer education. This portfolio plan also takes into account the realities of DSM program start-up costs and funds needed to adequately plan, develop and deliver and evaluate quality programs. It typically takes two years or more to ramp up programs and achieve significant customer participation levels and program savings, and the plan accounts for program ramp-up costs over the 2008-2009 time period. Over the ramp up period through 2009, UNSG expects that on average 55% of the program costs (depending on the program) will benefit customers directly in the form of incentives, training or education. Once the program has reached maturity, UNSG expects that over 60% of total program costs will go directly to customers. The balance of budget expenditures will be applied to program administration. Program administration expenses include all non-incentive expenses, including UNSG internal staff expenses, marketing and communications expenses, implementation contractor fees and expenses, measurement, evaluation and research, and other direct expenses attributable to the programs.

Incentive levels and other program elements will be reviewed and modified as needed during the first year from the approval date of this program, and periodically thereafter. Such modifications will be reported in the mid-year and year-end reports submitted to Staff.

For the purposes of presenting the proposed budgets for this plan, the program budgets have been broken into the following categories:

- **Rebates and Incentives** – Funds that go toward customer rebates and incentives, and installation of measures.
- **Training & Technical Assistance** – Funds that are used for energy-efficiency training and technical assistance.
- **Consumer Education** – Funds that are used to support general consumer education about the benefits of energy-efficient improvements and load management options.

- **Program Implementation** – Program delivery costs associated with implementing the program, including implementation contractor labor and overhead costs as well as other direct program delivery costs.
- **Program Marketing** – All expenses related to marketing the program and increasing DSM consumer awareness and participation.
- **Planning & Administration** – Costs related to planning, developing and administering the programs, including management of program budgets, oversight of implementation contractors, program coordination and general overhead expenses.
- **Measurement, Evaluation, and Research** – Program expenses related to conducting measurement and evaluation of savings attributable to the program and program operational efficiency, as well as related research activities.

Exhibit 4 below shows a summary roll-up of the anticipated budgets for each program by cost category for program years 2008-2012. Exhibit 5 presents the total annual budget for each program over the planning period from 2008 through 2012. Detailed annual budgets for each program year are included in the Attachments. These budgets represent UNSG's best estimate of spending, however, it is inevitable that some programs will achieve greater participation than others, and these budgets may need to be adjusted annually accordingly to maximize the effectiveness of the overall portfolio.

Exhibit 4

2008-2012 DSM Portfolio Budgets by Cost Category

Program	Total Administrative and O&M Cost Allocation	Total Marketing Allocation	Total Direct Implementation	Total EM&V Cost Allocation	Total Cost
Residential Efficiency Programs					
Low Income Weatherization	\$90,308	\$0	\$487,665	\$24,082	\$602,056
Energy Smart Homes	\$336,017	\$418,552	\$1,413,489	\$61,779	\$2,229,837
Efficient Home Heating	\$360,519	\$241,464	\$1,441,598	\$80,073	\$2,123,654
Residential Subtotal	\$786,844	\$660,016	\$3,342,753	\$165,934	\$4,955,547
Commercial & Industrial Efficiency Programs					
C&I Facilities Gas Efficiency	\$100,874	\$79,637	\$329,166	\$21,237	\$530,914
Total	\$887,718	\$739,653	\$3,671,919	\$187,171	\$5,486,461
% of Cost By Category	16.2%	13.5%	66.9%	3.4%	100.0%

Exhibit 5

2008-2012 DSM Portfolio Budgets by Year

Program	2008	2009	2010	2011	2012	Total Cost
Residential Efficiency Programs						
Low Income Weatherization	\$113,400	\$116,802	\$120,306	\$123,915	\$127,633	\$602,056
Energy Smart Homes	\$420,000	\$432,600	\$445,578	\$458,945	\$472,714	\$2,229,837
Efficient Home Heating	\$400,000	\$412,000	\$424,360	\$437,091	\$450,204	\$2,123,654
Residential Subtotal	\$933,400	\$961,402	\$990,244	\$1,019,951	\$1,050,550	\$4,955,547
Commercial & Industrial Efficiency Programs						
C&I Facilities Gas Efficiency	\$100,000	\$103,000	\$106,090	\$109,273	\$112,551	\$530,914
Total	\$1,033,400	\$1,064,402	\$1,096,334	\$1,129,224	\$1,163,101	\$5,486,461

5. Program Energy Savings and Benefits

UNSG has estimated the energy savings, costs, net benefits, and environmental benefits associated with each of the programs included in the proposed DSM portfolio. The following sections describe the energy savings, cost-effectiveness, and environmental benefits that are expected to accrue from the program.

5.1 Portfolio Energy Savings, Costs and Net Benefits

In preparing this plan, UNSG examined energy efficiency measures that are applicable to gas-fueled end use applications (electric and gas efficiency measures were examined for the low income program) and provide a broad set of natural gas savings opportunities in all of UNSG's customer sectors. The analysis included a detailed energy savings and a cost effectiveness analysis of each measure, as well as each program as a whole. In order to complete the analysis, UNSG assembled data on baseline and energy efficient performance of each measure technology as well as a range of other technical and financial data including:

- UNSG avoided cost data;
- Discount rates;
- Effective useful lifetimes ("EULs") for each measure;
- Incremental and installed measure costs for each measure; and
- Projected participation rates for each program over the projected program life presented in this plan.

For the analysis of net program benefits, UNSG has used avoided cost savings that will result from the expected energy savings generated by each DSM program in the proposed portfolio for measures implemented from 2008-2012. Levelized avoided cost data for a 20 year planning horizon was developed for use in the cost effectiveness analysis. UNSG has evaluated the cost effectiveness of each measure and each program as a whole using the Ratepayer Impact Measure ("RIM") test, the TRC test, and the SC test. The SC test is a variant of the TRC test and differs from the TRC test by including the valuation of environmental benefits and using a societal discount rate instead of the market discount rate used for the TRC. A societal discount rate of 5% was used in the computations of the SC test. For the analysis of the portfolio of

programs, UNSG quantified the expected environmental benefits resulting from measures installed through the program although they were not monetized for the purposes of cost-effectiveness testing.

Exhibit 6 provides estimates of the expected annual energy savings for each proposed DSM program and a summary of the net benefits (electric demand and energy savings were estimated for the Energy Smart Homes and low income programs only). In addition to the estimated savings and benefits shown in Exhibit 6, the portfolio is anticipated to produce other societal benefits based on the utility cost of capital. Exhibit 7 shows an estimate of the carbon dioxide air emission reductions that are expected as a result of the implementation of the measures promoted by the programs. Significant additional benefits which are expected to accrue to UNSG customers include increased levels of service, non-energy benefits such as increased comfort, and support for low-income households.

Exhibit 6 Electric Savings and Benefits 2008-2012 Programs

Program	Energy Savings (Therms)	Coincident Demand Savings (MW)	Energy Savings (MWh)	Program Budget (\$000)	Societal Benefits (\$000)	Societal Costs (\$000)	Net Benefits (\$000)
Residential Efficiency Programs							
Low Income Weatherization	41,207	0.02	245	\$602	\$442	\$602	-\$160
Energy Smart Homes	804,881	2.06	126	\$2,230	\$8,260	\$3,965	\$4,295
Efficient Home Heating	3,598,733	1.75	2,161	\$2,124	\$20,022	\$13,722	\$6,300
Residential Subtotal	4,444,820	3.83	2,532	\$4,956	\$28,747	\$18,289	\$10,435
Commercial & Industrial Efficiency Programs							
C&I Facilities Gas Efficiency	1,521,681	0.58	577	\$531	\$10,855	\$6,458	\$4,397
Total	5,966,501	4.41	3,109	\$5,486	\$39,602	\$24,747	\$14,832

In addition to the gas savings and benefits, additional energy savings resulting from programs in the portfolio include 3.15 MWh of electricity and 4.4 MW of coincident demand, primarily from energy efficient packaged gas heating / air conditioning systems to be installed through the Efficient Home Heating and C&I Facilities Gas Efficiency programs. The Energy Smart Home Program reduces electric energy consumption by 126 MWh and 2.06 MW, and the LIW Program reduces electric energy consumption by 245 MWh and 0.02 MW from 2008 through 2012.

Exhibit 7
DSM Benefit Cost Test
2008-2012 Programs

Program	Total Resource Cost Test	Societal Cost Test	Rate Payer Impact Measure Test
Residential Efficiency Programs			
Low Income Weatherization	0.73	0.90	0.42
Energy Smart Homes	2.08	2.74	0.64
Efficient Home Heating	1.46	1.82	0.37
Commercial & Industrial Efficiency Programs			
C&I Facilities Gas Efficiency	1.68	2.09	0.52

5.2 Environmental Benefits

In preparing this plan, UNSG has estimated the environmental benefits, as avoided CO₂ emissions and avoided water use, expected to result from measures installed as a result of the portfolio of DSM programs. Based on the direction of ACC staff, UNSG is reporting environmental benefits in this plan but has not monetized the benefits for the purposes of cost effectiveness analysis of measures and programs. The environmental reductions are based on the energy savings of all program measures over their expected useful lifetimes.

The factors used to calculate the DSM Environmental Benefits are shown in Exhibit 8. The CO₂ value for natural gas savings is derived from EPA's publication of Emission Factors, AP-42, 5th Edition. Although UNSG's customers utilize various types and sizes of natural gas combustors, conversion of fuel carbon to CO₂ is largely independent of combustion type and size. The CO₂ values for electricity savings and water savings are based on Arizona Public Service Co. estimates as presented in the "APS Demand Side Management Program Portfolio 2005-2007" p. 20.

Exhibit 8
Environmental Benefits Factors

Environmental Factor	Value	Units
CO ₂ Emissions Avoided (Natural Gas Savings)	0.0059	Tons CO ₂ /therm
CO ₂ Emissions Avoided (Electricity Savings)	917	Pounds CO ₂ /MW-hour
Water Saved	233	Gallons/MW-hour

Exhibit 9 shows the estimated CO₂ emissions avoided over the expected lifetime of all measures installed as a result of the proposed DSM portfolio.

Exhibit 9
DSM Estimated Environmental Benefits
2008-2012 Programs

Program	Avoided CO₂ (Tons)	Water Saved (Gal)
Low Income Weatherization	355	56,993
Energy Smart Homes	4,807	29,463
Efficient Home Heating	22,224	503,610
Residential Subtotal	27,386	590,066
C&I Facilities Gas Efficiency	8,978	0
Total	36,364	590,066

6. Program Marketing and Delivery

This section of the portfolio plan presents UNSG's proposed marketing and communications strategy, and implementation/delivery plan.

6.1 Program Marketing and Communications

This plan includes targeted marketing and communication of program offerings and benefits to encourage participation among customers, key market players and trade allies. The objective of the marketing and communications strategy is to make customers and key market actors aware of the program offerings and benefits, and to influence their decision making at the time of purchasing or installing gas-fueled energy systems or equipment in favor of choosing more energy efficient options.

The specifics of the marketing strategy depend on the program, but generally include a mix of internet, print media, radio, direct contact, direct mailings, bill inserts and presentations depending on the market to be reached. The program descriptions in the Attachments describe the proposed approach for each program.

6.2 Program Delivery and Implementation

UNSG proposes that programs be implemented using a mix of both in-house and outsourced resources. UNSG will likely outsource the implementation of the C&I Facilities Gas Efficiency Program as well as field verification inspections of measure installations. The delivery of the LIW program will also be outsourced to community action agencies. This enables UNSG to take advantage of outsourced experts who have

implemented similar programs in other areas, while also using in-house resources where appropriate. For all programs, UNSG will retain responsibility for program administration, measurement and evaluation, and reporting activities. UNSG intends to issue Requests for Proposals ("RFP") to qualified firms for all significant activities that will be outsourced.

Exhibit 10 provides a timeline that shows key dates and program implementation activities. For a detailed description of the proposed implementation schedule and implementation models for each individual program, see the program descriptions included in the Attachments.

Tasks	2007				2008				2009			
	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
Submit Portfolio Plan												
ACC Review & Approval												
Program Marketing & Communication Planning												
Submit RFP for IC and MER												
Select IC and MER Contractor												
Ongoing Low-Income Weatherization Implementation												
Energy Smart Homes Launch and Implementation												
Efficient Home Heating Program Launch and Implementation												
C&I Facilities Gas Eff. Program Launch and Implementation												
Program Impact and Process Evaluation												
Submit Updated Portfolio Plan												

Exhibit 10
Program Development and Implementation Timeline
2008-2012

7. Program Measurement, Evaluation and Research

Measurement, evaluation and research ("MER") is an integral component part of the proposed DSM Portfolio Plan. UNSG will select a MER contractor at the same time as selecting outsourced implementation services. UNSG will develop deemed savings values for all measures promoted by the program. UNSG will develop a database tracking system for monitoring program progress, and use the deemed savings values for tracking and reporting of program savings. UNSG will also adopt an integrated data collection strategy to support program management and MER activities. Integrated data collection requires that the data necessary to support program management and evaluation activities be collected throughout the course of program implementation. The integrated data collection process will

provide UNSG with the capacity to assess program progress and savings achievements on an ongoing basis. MER activities are expected to include:

- Verification that energy-efficiency measures are installed as expected;
- Impact analysis to compute the savings that are being achieved;
- Cost-effectiveness analysis; and
- Process evaluation to indicate how well programs are working to achieve objectives.

The MER contractor will work directly with UNSG and implementation contractors to ensure that the program design, database systems, and implementation processes will collect the necessary data for MER.

Low Income Weatherization Program

Attachment 1

Low Income Weatherization Program

Low Income Weatherization Program

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Low Income Weatherization Program

UNSG Low Income Weatherization Program

Program Concept and Description

Customers who receive weatherization assistance live with poverty level incomes (\$10,210 for a household of one; \$20,650 for a household of four). Utilities typically consume a larger portion of the low-income family's income than they consume of the higher income family's income. Low-income persons must often make monthly decisions as to whether to pay rent or mortgage, pay utilities, or buy food.

UNSG recognizes that many low-income customers live in older homes or mobile homes built when energy prices were low and energy efficient construction methods were not recognized. Many of these homes require significant repair to improve the livability of the structure and to incorporate some level of energy efficiency. The primary goal of the Low-income Weatherization ("LIW") Program is to provide financial assistance to install measures that improve comfort and reduce overall energy consumption for eligible customers. Steps taken through this program will reduce electric and gas bills and provide eligible customers with more disposable income for other needs.

The LIW Program is fuel neutral in that weatherization measures approved for the homes will result in a reduction of both electric and gas consumption. Most homes in this program either have no cooling source due to the weather patterns in the area or they have evaporative cooling and gas or electric space heating; therefore, the program is not expected to significantly reduce summer peak load but it will be an effective program in reducing consumption of natural gas. The main social benefits of the program will be the reduction of gas and electric heating bills for low-income customers.

Target Market

Promotion of the LIW Program is conducted by four agencies in the UNSG service territory: (1) Northern Arizona Council of Governments ("NACOG"); (2) Coconino County Community Services ("CCCS"); (3) Western Arizona Council of Governments ("WACOG") and (4) Southeastern Arizona Community Action Program ("SEACAP"). UNSG is proposing to increase available funding from \$71,500 annually to \$113,400 annually. Bill payment assistance is also available through the UNSG Warm Spirit program and UNSG provides the CARES pricing plan for low-income customers.

The target housing market is composed primarily of older mobile homes but also includes single family homes constructed of slump block and/or wood frame construction. All homes must receive gas service from UNSG. Income for participants must meet the guidelines established by the Arizona Department of Energy Weatherization. All participants must have household income levels at or below 150% of the poverty level. Eligible customers who are not already on the UNSG CARES Pricing Plan will be encouraged to participate in the CARES Pricing Plan.

Current Baseline Conditions

Customers who meet the income guidelines established by the Arizona Department of Energy Weatherization predominately live in housing projects comprised of older style mobile homes or older style single family residences constructed of wood frame or slump block. Each region in the UNSG

Low Income Weatherization Program

service territory may differ in the type and age of construction but one thing in common is that caulking and weather-stripping as well as heating, cooling and water heating equipment will be severely degraded. Many homes will not meet even minimum code requirements for electrical, mechanical, or plumbing.

Program Eligibility

All existing single family homes and mobile homes that receive gas service from UNSG, with household income at or below the guidelines established by the Arizona Department of Energy Weatherization will be eligible for participation. Homes must be owner-occupied or owners who have rental property occupied by low-income participants must sign off to approve any work completed by agencies. All participants must have household income levels at or below 150% of the poverty level.

NACOG, CCCS, WACOG and SEACAP will determine the customer priority based on a number of factors including but not limited to:

- No heat (winter) or no cooling (summer) is high priority;
- Age (80 or above or households with children age 10 or under receive high priority);
- Doctor recommendations due to physical handicap or illness receives high priority; and
- Number of people in household.

NACOS and WACOG also conduct work related to Emergency Home Repair. These homes may not necessarily require weatherization measures, but UNSG believes they present additional opportunities for agencies to include some basic and quick installations of energy saving measures. UNSG will request installation of low-flow shower heads, faucet aerators and CFL's when agencies complete Emergency Home Repair work. UNSG believes that these additions during an Emergency Home Repair visit add value to each customer and bolster energy and demand reductions.

Program Rationale

State and local funding available to non-profit agencies for assistance to low-income customers falls far short of the need that currently exists. Available funding also limits the amount of dollar benefit per household, the type of work it is used for and the amount of dollars allowed for program implementation and administration. Agencies also are limited on the number of homes they can weatherize each year because of a shortage of skilled labor to complete the necessary work, funding to add skilled labor, and the ability to find competent and honest outside contractors to complete the work.

UNSG funding allows agencies the ability to leverage other funds provided by the Federal Department of Energy ("DOE") and the Low Income Home Energy Assistance Program ("LIHEAP"). UNSG funding allows agencies to complete additional home repair, equipment repair or replacement, and nominal weatherization steps that impact energy consumption. Data provided by NACOG indicates that low-income customers that it serves receive \$2.32 of energy efficiency improvements for every \$1.00 funded by UNSG because of the ability to leverage other funds. As a result, agencies are able to complete more thorough repair or renovation on each home.

Low Income Weatherization Program

Program Objectives

- Allow up to \$2,000.00 per residence for weatherization, equipment repair, etc. for low-income customers;
 - Increase the number of homes weatherized or the extent of repair completed at each home;
 - Lower the average household energy costs for low-income customers; and
 - Improve the quality of life for customers in low-income neighborhoods.
-

Products and Services Provided

Analysis has been completed on a defined list of energy efficiency measures to determine energy and demand impact. This list is included as the measure level energy savings analysis in Appendix 2. Agencies will be allowed to use UNSG funding for any item on the approved list up to the maximum allowance of \$2,000 per home. Agency representatives will determine which items should be installed in each home. Some agencies limit measures installed to only those measures that contribute a minimum of 20% energy savings due to LIHEAP requirements. Other agencies are limited to assistance for equipment repair and/or replacement.

Agencies will be asked to install certain energy saving products in any home they enter through the emergency repair and/or flood repair programs. This will support an increase in installation of low-flow shower heads, faucet aerators, or CFLs.

Delivery Strategy and Administration

- Promotion of the LIW Program will occur through NACOG, CCCS, WACOG and SEACAP;
 - Funding will be provided to agencies from UNSG upon documentation of work completed;
 - NACOG, CCCS, WACOG and SEACAP will determine participant eligibility and priority and will complete all work; and
 - NACOG, CCCS, WACOG and SEACAP will provide program administration, marketing, planning, coordination, labor, materials, equipment and entering results into tracking software.
-

Marketing and Communications

When appropriate, UNSG employees inform customers about the program, local Department of Economic Security ("DES") representatives make referrals, health care service agencies and individual case workers also make referrals. UNSG provides a page on its Web site that directs interested parties to call the NACOG, CCCS, WACOG or SEACAP.

Low Income Weatherization Program

Program Implementation Schedule

UNSG intends to continue the existing LIW Program until the implementation of any new program elements. This will provide time to transition agencies to new program elements following approval by ACC.

The following table shows the estimated timeline for key program activities by quarter assuming program approval by the ACC by the third quarter of 2007:

Table 1. Program Implementation Schedule

Program Activities	2007				2008				2009			
Continue ongoing LIW program												
New program pre-approval submit												
New program approval (estimated)												
Meetings/Notifications to Agencies												
Implementation by Agencies												
Process evaluation												
Savings verification												
Program redesign as needed												

Monitoring and Evaluation Plan

The current LIW Program generated no claims from UNSG of energy savings because individual measures were not tracked. Development of the new program, however, will include calculations for energy savings and therefore work completed at each location will be tracked. UNSG plans to pursue development of an on-line process agencies can use to provide information of each measure installed with appropriate address, dates, and other information.

UNSG will adopt a strategy that calls for integrated data collection that is designed to provide a quality data resource for program tracking, management and evaluation. This approach will entail the following primary activities:

- **Database tracking system development** - As part of detailed program design, UNSG will develop a database tracking system that will be used to collect the necessary data elements and provide the reporting functions needed to track program process and provide a data resource for program evaluation.
- **Integrated implementation data collection** - UNSG will work with the implementation contractor to establish systems to collect the data needed to support effective program management and evaluation through the implementation and customer application processes. The database tracking system will be integrated with implementation data collection processes.
- **Field verification** - UNSG will conduct field verification of the installation of a sample of measures throughout the implementation of the program.
- **Tracking of savings using deemed savings values** - UNSG will develop deemed savings values for each measure and technology promoted by the program and periodically review and revise the savings values to be consistent with program participation and accurately estimate the savings being achieved by the program.

Low Income Weatherization Program

This approach will provide UNSG with ongoing feedback on program progress and enable management to adjust or correct the program measures to be more effective, provide a higher level of service, and be more cost beneficial. Integrated data collection will provide a high quality data resource for evaluation activities.

Program Budget (Future)

The 2008 program year annual budget of approximately \$113,400 will be allocated as shown in Table 2, while Table 3 provides the expected program budgets through 2012. Allowing for a 3% annual inflation rate, the average annual budget is approximately \$120,411. Appendix 1 provides additional details on the 2008 budget.

Table 2. 2008 Program Budget

Total Program Budget	\$113,400
Total Administrative and O&M Cost Allocation	
Managerial & Clerical	\$15,309
Travel & Direct Expenses	\$0
Overhead	\$1,701
Total Administrative Cost	\$17,010
Total Marketing Allocation	
Internal Marketing Expense	\$0
Subcontracted Marketing Expense	\$0
Total Marketing Cost	\$0
Total Direct Implementation	
Financial Incentives	\$86,343
Support Activity Labor	\$2,756
Hardware & Materials	\$0
Rebate Processing & Inspection	\$2,756
Total Direct Installation Cost	\$91,854
Total EM&V Cost Allocation	
EM&V / Research Activity	\$4,082
EM&V Overhead	\$454
Total EM&V Cost	\$4,536

Table 3. 2008 – 2012 Program Budget

Year	2008	2009	2010	2011	2012
Total Budget	\$113,400	\$116,802	\$120,306	\$123,915	\$127,633
Incentives	\$86,343	\$88,933	\$91,601	\$94,349	\$97,180
Administrative Costs	\$27,057	\$27,869	\$28,705	\$29,566	\$30,453
Incentives as % of Budget	76%	76%	76%	76%	76%

Estimated Energy Savings

Low Income Weatherization Program

UNSG expects that, on average 42 low income customers will be served annually throughout UNSG service territory through a combination of all four agencies. The energy savings from this activity are presented in Table 5. Appendix 2 provides further information about estimated energy savings for each measure, including the measure and program level benefit cost analysis. The average per site energy savings of approximately 1167 kWh and 196 Therms are expected to reduce customer bills by approximately \$388 annually.

Table 4. Low Income Weatherization Program Annual Energy Savings

Year	2008	2009	2010	2011	2012
Number of customers	39	41	42	43	44
Non-coincident peak (kW)	15	15	16	16	17
Coincident peak (kW)	3	3	3	4	4
Energy Savings (kWh)	46,073	47,455	48,879	50,345	51,855
Energy Savings (Therms)	7,761	7,994	8,234	8,481	8,736

As a result of the energy savings shown above, it is estimated that the program will produce environmental benefits through avoided emissions and avoided water use. The estimated additional benefits from 2008 – 2012 are presented in Table 5.

Table 5. Projected Environmental Benefits, 2008 – 2012

CO ₂ Emissions Avoided	355	Tons
Water Saved	56,993	Gal

Note: A portion of the CO₂, and all of the water benefits are related to electricity savings and are based on Arizona Public Service Co. estimates as presented in the "APS Demand Side Management Program Portfolio 2005-2007" p. 20.

Program Cost Effectiveness

The cost effectiveness of each measure and the program as a whole was assessed using the Total Resource Cost ("TRC") test, the Societal Cost ("SC") test and the Ratepayer Impact Measure ("RIM") test as defined by the California Standard Practice Manual. Measure analysis worksheets showing all energy savings, cost and cost-effectiveness calculations are included in Appendix 2.

The cost effectiveness analysis requires estimation of:

- net demand and energy savings attributable to the program;
- UNSG program administration costs;
- the present value of program benefits including UNSG avoided costs over the life of the measures; and
- UNSG lost revenues.

Figure 6 provides a summary of the benefit/cost analysis results for this program. A detailed benefit/cost analysis is presented in Appendix 2.

Table 6. Benefit-cost Analysis Results

Cost Effectiveness Tests	TRC	SC	RIM
Benefit/Cost Ratio	0.73	0.90	0.42

Low Income Weatherization Program

Figure 7 provides addition program and financial assumptions, by measure category, used to derive the program level cost-benefits. Additional details for each measure category can be found in Appendix 2.

Table 7. Other Financial Assumptions

PROGRAM DATA	Lighting	Weather	Insulation	HVAC	Hot Water	Appliances	Health and Safety
Conservation Life (yrs):	5	10	20	15	5	10	15
Program Life (yrs):	5	5	5	5	5	5	5
Demand Avoided Costs (\$/kW):	55.23	58.74	64.94	61.99	55.23	58.74	61.99
Summer Energy Avoided Costs (\$/kWh):	0.0722	0.0707	0.0731	0.0722	0.0722	0.0707	0.0722
Winter Energy Avoided Costs (\$/kWh):	0.0701	0.0686	0.0707	0.0694	0.0701	0.0686	0.0694
Levelized Therms:	0.8691	0.8920	0.9451	0.9194	0.8691	0.8920	0.9194
Admin. Costs:	31.34%	31.34%	31.34%	31.34%	31.34%	31.34%	31.34%
TRC Discount Rate:	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%
Social Discount Rate:	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
NTG Ratio:	100%	100%	100%	100%	100%	100%	100%

A detailed benefit/cost analysis is presented in Appendix 4.

Low Income Weatherization Program

Appendix 1 – Program Costs

2008 Program Costs Details

Budget Items	Budget	Allocation Rate (%)
Administrative		
Managerial and Clerical Labor	\$15,309	
Labor – Clerical	\$612	4.0%
Labor - Program Design	\$612	4.0%
Labor - Program Development	\$612	4.0%
Labor - Program Planning	\$2,296	15.0%
Labor - Program/Project Management	\$1,531	10.0%
Labor - Staff Management	\$765	5.0%
Labor - Staff Supervision	\$765	5.0%
Subcontractor Labor - Clerical	\$765	5.0%
Subcontractor Labor - Program Design	\$4,593	30.0%
Subcontractor Labor - Program Development	\$765	5.0%
Subcontractor Labor - Program Planning	\$765	5.0%
Subcontractor Labor - Program/Project Management	\$1,225	8.0%
Subcontractor Labor - Staff Management	\$0	0.0%
Subcontractor Labor - Staff Supervision	\$0	0.0%
<i>Subtotal Managerial and Clerical Labor</i>	<i>\$15,309</i>	<i>100.0%</i>
Travel & Direct Expenses	\$0	
Conference Fees	\$0	30.0%
Labor - Conference Attendance	\$0	20.0%
Subcontractor - Conference Fees	\$0	2.0%
Subcontractor - Travel - Airfare	\$0	4.0%
Subcontractor - Travel - Lodging	\$0	0.0%
Subcontractor - Travel - Meals	\$0	0.0%
Subcontractor - Travel - Mileage	\$0	0.0%
Subcontractor - Travel - Parking	\$0	0.0%
Subcontractor - Travel - Per Diem for Misc. Expenses	\$0	8.0%
Subcontractor Labor - Conference Attendance	\$0	2.0%
Travel – Airfare	\$0	14.0%
Travel – Lodging	\$0	6.0%
Travel – Meals	\$0	3.0%
Travel – Mileage	\$0	1.0%
Travel – Parking	\$0	0.0%
Travel - Per Diem for Misc. Expenses	\$0	10.0%
<i>Travel & Direct Expenses</i>	<i>\$0</i>	<i>100.0%</i>
Overhead (General and Administrative) - Labor and Materials	\$1,701	

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Equipment - Communications	\$34	2.0%
Equipment - Computing	\$34	2.0%
Equipment - Document Reproduction	\$34	2.0%
Equipment - General Office	\$34	2.0%
Equipment - Transportation	\$34	2.0%
Facilities - Lease/Rent Payment	\$0	0.0%
Labor - Accounts Payable	\$17	1.0%
Labor - Accounts Receivable	\$17	1.0%
Labor - Administrative	\$17	1.0%
Labor - Automated Systems	\$0	0.0%
Labor - Communications	\$17	1.0%
Labor - Contract Reporting	\$17	1.0%
Labor - Corporate Services	\$17	1.0%
Labor - Facilities Maintenance	\$17	1.0%
Labor - Information Technology	\$17	1.0%
Labor - Materials Management	\$17	1.0%
Labor - Procurement	\$17	1.0%
Labor - Regulatory Reporting	\$680	40.0%
Labor - Shop Services	\$17	1.0%
Labor - Telecommunications	\$17	1.0%
Labor - Transportation Services	\$17	1.0%
Office Supplies	\$17	1.0%
Postage	\$17	1.0%
Subcontractor - Equipment - Communications	\$0	0.0%
Subcontractor - Equipment - Computing	\$0	0.0%
Subcontractor - Equipment - Document Reproduction	\$0	0.0%
Subcontractor - Equipment - General Office	\$0	0.0%
Subcontractor - Equipment - Transportation	\$0	0.0%
Subcontractor - Facilities - Lease/Rent Payment	\$0	0.0%
Subcontractor - Office Supplies	\$0	0.0%
Subcontractor - Postage	\$0	0.0%
Subcontractor Labor - Accounts Payable	\$0	0.0%
Subcontractor Labor - Accounts Receivable	\$0	0.0%
Subcontractor Labor - Administrative	\$0	0.0%
Subcontractor Labor - Automated Systems	\$0	0.0%
Subcontractor Labor - Communications	\$0	0.0%
Subcontractor Labor - Contract Reporting	\$0	0.0%
Subcontractor Labor - Corporate Services	\$0	0.0%
Subcontractor Labor - Facilities Maintenance	\$0	0.0%
Subcontractor Labor - Information Technology	\$0	0.0%
Subcontractor Labor - Materials Management	\$0	0.0%

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Subcontractor Labor - Procurement	\$0	0.0%
Subcontractor Labor - Regulatory Reporting	\$595	35.0%
Subcontractor Labor - Shop Services	\$0	0.0%
Subcontractor Labor - Telecommunications	\$0	0.0%
Subcontractor Labor - Transportation Services	\$0	0.0%
<i>Subtotal Overhead</i>	<i>\$1,701</i>	<i>100.0%</i>
Total Administrative Costs	\$17,010	
Marketing/Advertising/Outreach		
Internal Marketing Expense	\$0	
Advertisements / Media Promotions	\$0	25.0%
Bill Inserts	\$0	4.0%
Brochures	\$0	6.0%
Door Hangers	\$0	0.0%
Labor - Business Outreach	\$0	5.0%
Labor - Customer Outreach	\$0	5.0%
Labor - Customer Relations	\$0	5.0%
Labor - Marketing	\$0	30.0%
Print Advertisements	\$0	15.0%
Radio Spots	\$0	5.0%
<i>Subtotal Internal Marketing Expense</i>	<i>\$0</i>	<i>100.0%</i>
Subcontracted Marketing Expense	\$0	
Subcontractor - Bill Inserts	\$0	5.0%
Subcontractor - Brochures	\$0	5.0%
Subcontractor - Door Hangers	\$0	0.0%
Subcontractor - Print Advertisements	\$0	0.0%
Subcontractor - Radio Spots	\$0	10.0%
Subcontractor - Television Spots	\$0	0.0%
Subcontractor Labor - Business Outreach	\$0	5.0%
Subcontractor Labor - Customer Outreach	\$0	5.0%
Subcontractor Labor - Customer Relations	\$0	5.0%
Subcontractor Labor - Marketing	\$0	5.0%
Television Spots	\$0	0.0%
Website Development	\$0	60.0%
<i>Subtotal Subcontracted Marketing Expense</i>	<i>\$0</i>	<i>100.0%</i>
Total Marketing/Advertising/Outreach	\$0	
Direct Implementation		
Financial Incentives to Customers	\$86,343	
Activity - Labor	\$2,756	
Labor - Curriculum Development	\$220	8.0%
Labor - Customer Education and Training	\$1,102	40.0%

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Labor - Customer Equipment Testing and Diagnostics	\$0	0.0%
Labor - Facilities Audits	\$827	30.0%
Subcontractor Labor - Facilities Audits	\$276	10.0%
Subcontractor Labor - Curriculum Development	\$138	5.0%
Subcontractor Labor - Customer Education and Training	\$138	5.0%
Subcontractor Labor - Customer Equipment Testing and Diagnostics	\$55	2.0%
<i>Subtotal Activity</i>	<i>\$2,756</i>	<i>100.0%</i>
Hardware and Materials - Installation and Other DI Activity	\$0	
Audit Applications and Forms	\$0	8.0%
Direct Implementation Literature	\$0	20.0%
Education Materials	\$0	20.0%
Energy Measurement Tools	\$0	10.0%
Installation Hardware	\$0	10.0%
Subcontractor - Direct Implementation Literature	\$0	4.0%
Subcontractor - Education Materials	\$0	4.0%
Subcontractor - Energy Measurement Tools	\$0	16.0%
Subcontractor - Installation Hardware	\$0	6.0%
Subcontractor - Audit Applications and Forms	\$0	2.0%
<i>Subtotal Hardware and Materials</i>	<i>\$0</i>	<i>100.0%</i>
Rebate Processing and Inspection - Labor and Materials	\$2,756	
CARE Billing Assistance	\$2,756	100.0%
Labor - Rebate Processing	\$0	0.0%
Labor - Site Inspections	\$0	0.0%
Rebate Applications	\$0	0.0%
Subcontractor - Rebate Applications	\$0	0.0%
Subcontractor Labor - Field Verification	\$0	0.0%
Subcontractor Labor - Rebate Processing	\$0	0.0%
Subcontractor Labor - Site Inspections	\$0	0.0%
<i>Subtotal Rebate Processing and Inspection</i>	<i>\$2,756</i>	<i>100.0%</i>
Total Direct Implementation	\$91,854	
Evaluation, Measurement and Verification		
EM&V Labor and Materials	\$4,082	
Labor - EM&V	\$204	5.0%
Materials - EM&V	\$204	5.0%
Subcontractor Labor - EM&V	\$3,674	90.0%
<i>Subtotal EM&V Activity - Labor</i>	<i>\$4,082</i>	<i>100.0%</i>
EM&V Overhead	\$454	
Benefits - EM&V Labor	\$0	0.0%
Overhead - EM&V	\$227	50.0%
Subcontractor Overhead - EM&V	\$0	0.0%
Subcontractor Travel - EM&V	\$0	0.0%
Travel - EM&V	\$227	50.0%

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<i>Subtotal EM&V Overhead</i>	<i>\$454</i>	<i>100.0%</i>
Total EM&V	\$4,536	
Total Budget	\$113,400	

Key benefit – cost metrics

Incentive Calculations

RATE DATA										OPERATING DATA		OTHER FACTORS					
Rate Class: CARES										Average measure life		13.141		Line Loss Factor:		10.69%	
\$/kW:										0.00		0.22		Capacity Reserve Factor:		0.00%	
\$/kWh, On-Peak:										0.10				Application:		RET	
\$/kWh, Off-Peak:										0.10				Cost Basis:		Full Installed	
\$/Therm										1.40							

PROGRAM DATA										INCENTIVE CALCULATIONS				CUSTOMER COST/SAVINGS				TRC	
Measure Description	Non Coin. Demand Savings (kW)	Summer Energy Savings (kW/h)	Winter Energy Savings (kW/h)	Energy Savings (Therms)	IRP		Social		PV Program Cost (\$)	NPV (\$)	Incr. Cost		Cost Savings		Payback w/Inc. (yrs)	BC Ratio			
					Benefit (\$)	%	Benefit (\$)	%			Cost (\$)	Savings (\$)							
Lighting Total	0.275	143.8	143.8	0.0	\$155	\$171	\$72	\$0	\$95	\$60	\$72.40	\$28	2.6	0.0	1.63				
Weatherization Total	0.000	21.3	21.3	61.6	\$382	\$449	\$241	\$1	\$316	\$66	\$240.80	\$90	2.7	0.0	1.21				
Insulation Total	0.000	127.1	127.1	35.3	\$508	\$669	\$258	\$1	\$338	\$69	\$257.66	\$74	3.5	0.0	1.50				
HVAC Total	0.080	235.6	101.0	62.8	\$746	\$933	\$1,096	\$1	\$1,439	-\$693	\$1,096.02	\$121	9.1	0.0	0.52				
Domestic Hot Water Total	0.000	9.3	9.3	21.7	\$80	\$88	\$226	\$3	\$297	-\$217	\$226.39	\$32	7.0	0.0	0.27				
Appliances Total	0.026	113.8	113.8	2.0	\$138	\$162	\$248	\$2	\$325	-\$187	\$247.75	\$25	9.9	0.0	0.42				
Health and Safety	0.000	0.0	0.0	13.1	\$100	\$125	\$46	\$0	\$61	\$40	\$46.25	\$18	2.5	0.0	1.65				
Total All Projects	0.381	650.881	516.259	196.617	2109.511	2597.111	2187.274	8.152	2872.700	-763.188	2187.274	388.789	37.285	0.000	0.7343				

Excel spreadsheet with additional program benefit/cost calculations available upon request.

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Unit capacity and energy savings

DEMAND/ENERGY SAVINGS AND COSTS									
Measure Description	Cost Unit	Cost Units per Site	Non-Coin. Demand Savings (KW)	Coin. Factor	Coin. Demand Savings (KW)	Energy Savings (KWh)	Energy Savings (Therms)	Incr. Cost (\$)	% Incent per customer (%)
LIGHTING MEASURES									
- Standard CFL	Lamp	1	0.052	10%	0.01	56.94	0	\$13.80	60%
- 3-way CFL	Lamp	1	0.070	10%	0.01	60.05	0	\$16.20	60%
- R-30 and R-40	Lamp	1	0.067	10%	0.01	57.47	0	\$14.50	60%
- 3w and 7w	Lamp	1	0.018	10%	0.00	15.44	0	\$7.00	60%
- Torchiere lamp	Lamp	1	0.245	10%	0.02	268.28	0	\$65.00	60%
- Nite Lite/Lime Lite	Lamp	1	0.007	10%	0.00	25.45	0	\$5.00	50%
Weighted Average Lighting			0.275		0.027	287.633	0.000	\$72.40	
WEATHERIZATION MEASURES									
Interior/Exterior Caulking	per site	1	0.00		0.00	0.64	0.025	\$52.00	80%
Aerosol Foam Sealant	per site	1	0.00		0.00	1.14	0.045	\$52.00	20%
Door Weatherstrip	per unit	1	0.00		0.00	0.65	0.026	\$53.00	100%
Window Weatherstrip	per inch	100	0.00		0.00	15.23	60.482	\$10.00	100%
Door Sweep	per unit	2	0.00		0.00	18.17	0.725	\$46.00	100%
Replace standard hollow door with insulated door	per door	1	0.00		0.00	15.15	0.570	\$93.00	20%
Replace broken single-pane windows with double pane/low e window	per sq ft	9	0.00		0.00	11.79	0.441	\$153.00	40%
Weighted Average Weatherization			0.000		0.000	42.542	61.553	\$240.80	460%
INSULATION MEASURES									
Attic Insulation									
-Blown cellulose, unfloored									
R-11	Per Sq.Ft.	1000	0.00		0.00	321.92	44.782	\$270.00	4.35%
R-15	Per Sq.Ft.	1000	0.00		0.00	276.69	37.767	\$270.00	4.35%
R-19	Per Sq.Ft.	1000	0.00		0.00	274.94	37.325	\$270.00	4.35%
R-23	Per Sq.Ft.	1000	0.00		0.00	246.55	33.910	\$270.00	4.35%
R-27	Per Sq.Ft.	1000	0.00		0.00	242.14	33.384	\$270.00	4.35%
R-30	Per Sq.Ft.	1000	0.00		0.00	241.93	33.396	\$270.00	4.35%

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R-34	Per	Sq.Ft.	1000	0.00	0.00	224.31	30.945	\$270.00	4.35%
R-38	Per	Sq.Ft.	1000	0.00	0.00	213.41	29.379	\$270.00	4.35%
-Blown cellulose, floored									
R-14	Per	Sq.Ft.	1000	0.00	0.00	282.46	39.603	\$270.00	4.35%
R-18	Per	Sq.Ft.	1000	0.00	0.00	277.63	38.345	\$270.00	4.35%
R-22	Per	Sq.Ft.	1000	0.00	0.00	255.35	34.965	\$270.00	4.35%
R-26	Per	Sq.Ft.	1000	0.00	0.00	246.16	33.878	\$270.00	4.35%
R-30	Per	Sq.Ft.	1000	0.00	0.00	241.93	33.396	\$270.00	4.35%
-Fiberglass, batts									
-R13	Per	Sq.Ft.	1000	0.00	0.00	291.30	41.073	\$270.00	4.35%
-R19	Per	Sq.Ft.	1000	0.00	0.00	271.20	37.736	\$270.00	4.35%
-R30	Per	Sq.Ft.	1000	0.00	0.00	241.93	33.396	\$270.00	4.35%
-R38	Per	Sq.Ft.	1000	0.00	0.00	213.41	29.379	\$270.00	4.35%
Floor Insulation Fiberglass									
-R19 - including supports (batt hangers or twine)	Per	Sq.Ft.	500	0.00	0.00	146.57	18.272	\$135.00	4.35%
-R30 - including supports (batt hangers or twine)	Per	Sq.Ft.	500	0.00	0.00	131.18	17.986	\$135.00	4.35%
Add R5 duct insulation to gas heat/ elect AC (or coat to similar R value)	home		1	0.00	0.00	27.05	38.344	\$132.00	10.00%
Add R5 duct insulation to elect heat/ elect AC (or coat to similar R value)	home		1	0.00	0.00	278.12	0.000	\$132.00	10.00%
Sidewall Insulation (Blown In)									
- Asbestos Shingled	Per	Sq.Ft.	500	0.00	0.00	129.37	21.944	\$135.00	4.35%
- Asphalt / Wood Siding	Per	Sq.Ft.	500	0.00	0.00	129.37	21.944	\$135.00	4.35%
- Stucco Siding	Per	Sq.Ft.	500	0.00	0.00	129.37	21.944	\$135.00	4.35%
Unfinished Wall Insulation									
- R19 Fiberglass	Per	Sq.Ft.	200	0.00	0.00	116.37	19.856	\$54	4.35%
Weighted Average Insulation				0.000		0.000	254.233	35.339	\$257.66
HVAC MEASURES									120%
Full tune-ups of Furnace, Central A/C and Heat pumps	Per	home	1	0.00	0.00	331.00	15.000	\$300.00	40.00%
Central A/C Filter (cleaning or replacement)	Per		1	0.00	0.00	132.34	5.000	\$35.00	60.00%

Low Income Weatherization Program

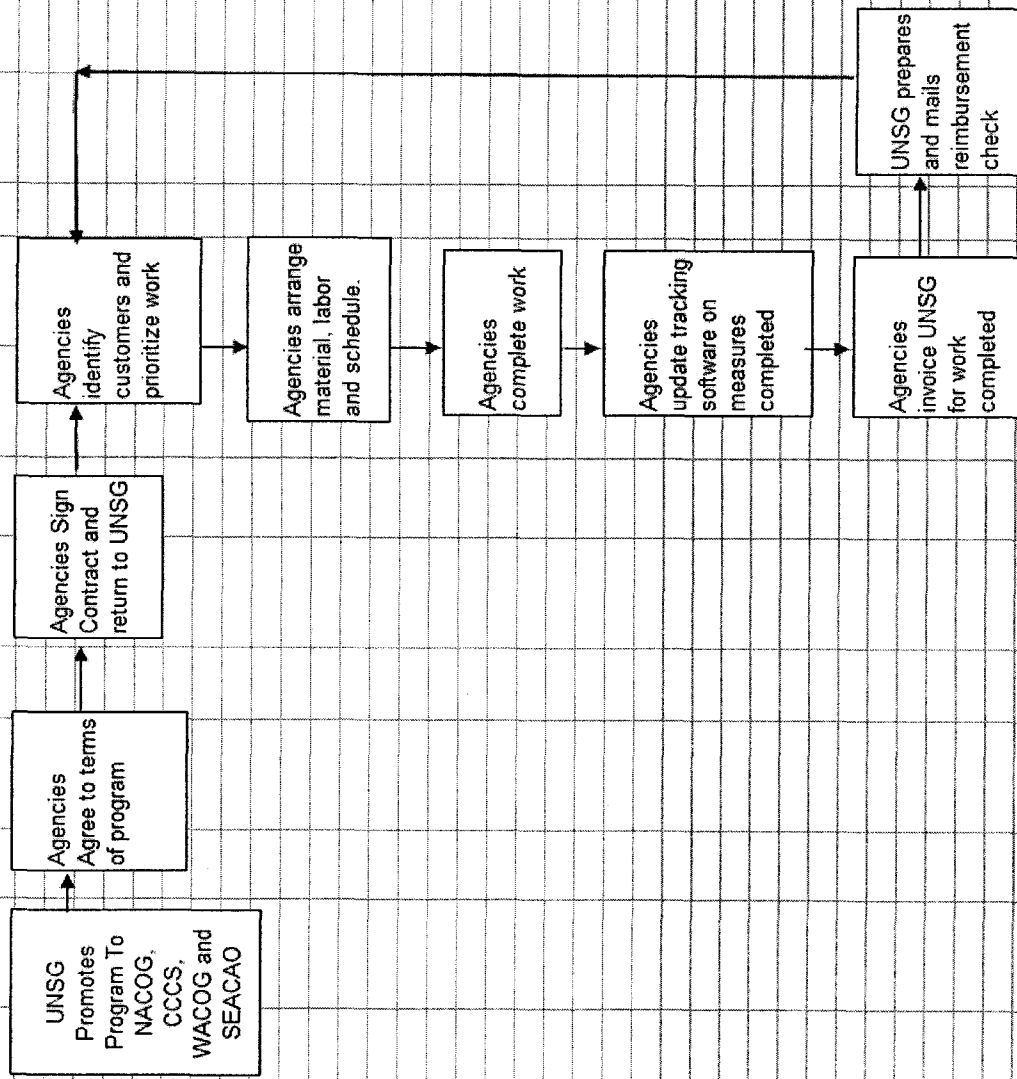
Central A/C Coil (cleaning)	home Per	1	0.00	0.00	132.34	2.000	\$250.00	25.00%
Sealing ducts with mastic	home Per	1	0.00	0.00	24.36	11.425	\$282.46	60.00%
Window/wall AC Filter (cleaning or replacement)	home Per	1	0.00	0.00	55.31	0.000	\$35.00	20.00%
Electric Heating System Thermostat (digital, line voltage)	home Per	1	0.00	0.00	196.45	0.000	\$98.00	20.00%
Gas Heating System Thermostat (digital, line voltage)	home Per	1	0.00	0.00	0.00	43.000	\$126.00	50.00%
Install 80 AFUE Furnace, increase AFUE by 15%	home Per	1	0.00	0.00	0.00	99.000	\$1,870.00	25.00%
Solar Screen	home Per	1	0.00	0.00	25.00	0.306	\$225.00	30.00%
Install attic ventilation (only with AC)	home Per	1	0.10	0	0.00	0.000	\$450.00	10.00%
Replace Single Speed cooler motor with 2-speed motor (1/3 - 1/2)	home Per	1	0.20	0	0.00	0.000	\$210.00	10.00%
Replace Single Speed cooler Motor with 2-speed motor (3/4)	home Per	1	0.20	0	0.00	0.000	\$230.00	10.00%
Plant trees on South and West Exposure (use 0.57 kW and 128 kWh annually per tree)	home Per	1	0.20	1	0.20	1.000	\$63.00	15.00%
Weighted Average HVAC			0.080	0.030	336.554	62.847	1096.025	29%
DOMESTIC HOT WATER MEASURES								
Water-saving Showerhead w /Massage (with shutoff 2.5 gpm or less)		1	0.00	0.00	0.00	12.460	\$25.03	10%
Water-saving Hand Held Showerhead (with shutoff 2.5 gpm or less)		1	0.00	0.00	0.00	12.460	\$23.03	50%
Water Heater Insulation Blanket		1	0.00	0.00	0.00	7.000	\$32.40	50%
High Efficiency Water Heater - Gas, EF = 0.63		1	0.00	0.00	0.00	18.000	\$449.00	20%
High Efficiency Water Heater - Elect, EF = 0.93		1	0.00	0.00	0.00	0.000	\$449.00	20%
Faucet Flow restrictor		2	0.00	0.00	0.00	7.690	\$15.10	70%
Domestic Hot Water Pipe Insulation (seal all seams and joints; duct tape not permitted)		1	0.00	0.00	0.00	3.560	\$12.00	50%
Weighted Average Domestic Hot Water			0.000	0.000	18.600	21.739	226.388	39%
APPLIANCES MEASURES								
15 c.f.		1	0.05	1	0.05	474.50	\$478.00	10%
18 c.f. w/ice		1	0.06	1	0.06	511.00	\$645.00	10%
18 c.f. w/o ice		1	0.06	1	0.06	511.00	\$645.00	5%
21 c.f. w/ice		1	0.08	1	0.08	689.85	\$688.00	10%
21 c.f. w/o ice		1	0.08	1	0.08	689.85	\$688.00	5%
Weighted Average Appliances			0.026	0.026	227.578	2.000	247.750	8%
HEALTH, SAFETY & MISCELLANEOUS MEASURES								
Install CO2 Sensor	Per home	1	0.00	1	0.00	0.00	\$85.00	25%

Low Income Weatherization Program

Repair/replace all connections related to installation and operation of evaporative cooler (no impact)	Per home	1	0.00	1	0.00	0.00	0.00	0.00	\$150.00	10%
Gas leak repair	Per home	1	0.00	1	0.00	0.00	0.00	65.700	\$50.00	20%
Weighted Average H&S			0.000		0.000	0.000	0.000	13.140	46.250	18%

Low Income Weatherization Program

Appendix 3 - Low Income Weatherization Program Implementation Process



Residential New Construction Program

Attachment 2

Residential New Construction Program

Residential New Construction Program

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Residential New Construction Program

Program Concept and Description

UniSource Energy Services ("UES") is made up of both UNS Gas ("UNSG") and UNS Electric ("UNSE") utilities. UES is facing a tremendous increase in energy demand stemming from existing developer plans to build more than 200,000 new homes in Mohave County. One developer, Rhodes Homes, has a substantial amount of land and plans to develop more than 130,000 homes. This increased activity is largely the result of a Hoover Dam bypass, scheduled for 2010 completion, which will significantly decrease travel time between Las Vegas, Nevada and Mohave County, especially Kingman. In short, developers' existing plans – and the rapid sale of these lots – mean that Kingman will soon be a suburb of Las Vegas and Clark County, Nevada. This boom in homebuilding presents an enormous challenge for UES, who must meet the increased energy demands these new homes represent. Further, there is no existing energy code in UES territory to help the utility control energy demand.

The Residential New Construction Program for UNSG will be marketed under the name of Energy Smart Homes ("ESH"). All future references to the actual UNSG program will be ESH. The UNSG ESH program will emphasize the whole-house approach to improving health, safety, comfort, durability and energy efficiency. The program will promote homes that meet the 2006 EPA/DOE Energy Star Home® performance requirements. Performance requirements differ by climate zone. Appendix 1 shows climate zones within UNSG service territory and Energy Star Home® performance requirements for each climate zone (from www.energystar.gov). To encourage program participation by builders, the program will provide incentives to home builders for each qualifying ESH. Required on-site inspections and field testing of a random sample of homes to meet Energy Star Home® performance requirements will be conducted by third-party RESNET certified energy raters selected by each builder.

Educational and promotional pieces and design tools will assist builders and associated trade allies (architects and engineers, sub-contractors, etc.) with the construction standards that meet or exceed the ESH program standards.

In 2005, UNSG contracted with ECOS Consulting to complete a comprehensive and updated analysis on the expected savings gained from ESH standards compared to current market conditions and building practices in Mohave and Santa Cruz counties. Results of the 2007 analysis plus the addition of simulation results for Flagstaff completed by Summit Blue Consulting provide the basis for the energy and capacity savings used for the benefit cost analysis. Savings are based on heating, cooling and hot water energy use and are achieved through a combination of 1) building envelope upgrades; 2) high performance windows; 3) controlled air filtration; 4) upgraded heating and cooling systems; 5) tight duct systems; and 6) upgraded water heating equipment.

New homes constructed through the program will be eligible to display the Energy Star Home® seal.

Builders will sign on as an Environmental Protection Agency / Department of Energy ("EPA/DOE") Energy Star Home® partners and agree to adhere to all requirements of that program. UNSG will provide training and education about building science and the whole-house approach to building homes, marketing and builder incentives. The training and education will be offered to homebuyers, builders, sub-contractors and realtors/builder sales agents. Training is aimed at increasing the applied knowledge of building science and energy efficient building practices to transform the market and improve construction practices in the UNSG service territories.

Residential New Construction Program

Target Market

The target market is comprised of all individually metered new homes that receive gas service from UNSG. This includes home developments, townhomes and condominium projects where individual units are sold to homeowners and custom home projects. The program will be marketed to all builders within the UNSG service territory.

Current Baseline Conditions

A baseline study was completed by Ecos Consulting in February 2006 for UNSE to determine potential savings from a residential new construction program in Mohave and Santa Cruz counties. The information gathered in this report is also valid for UNSG since both counties surveyed by Ecos are also within the UNSG service territory. The colder climates in UNSG service territory were not included in the Ecos report. However with the absence of adopted energy codes, UNSG believes the baseline construction standards will be similar.

The UNSG service territory includes both rural and metro areas and a variety of baseline housing designs. In metro areas like Kingman and Flagstaff the market may be dominated by production home builders. In the resort areas of Pinetop and Prescott the market may be dominated by custom home builders. In other rural areas the market may be dominated by mobile homes.

We believe builders in Pinetop, Prescott, Sedona and Flagstaff may already practice higher building standards than other builders due to the price-range, the cold climate, and the custom clients they work with. This market may be considered similar to the building standards shown in Lake Havasu. Builders in other UNSG service territories may produce only minimum code compliant homes similar to those found in Kingman.

Climate factors are an important consideration in program design for any residential new construction program. Ecos compared key climatic data for sites throughout UNSG territory. It is important to note that gas savings can be secured through a residential new construction program and is the most important consideration for UNSG.

UNSG contracted with Summit Blue Consulting to expand the simulations to include the same baseline home with Flagstaff weather data. The combination of results from the Ecos evaluation and the Summit Blue evaluation will be used in this report. Kingman weather and construction standards represents the average conditions for warm-weather areas served by UNSG and Flagstaff weather and construction standards represents the average for cold-weather areas served by UNSG.

Throughout UNSG service territories, it is estimated that an average of 5,435 new units per year will be built from 2008 through 2012.

Program Eligibility

- Must be a builder of newly-constructed residential single-family residences (including townhomes, condominiums and duplexes) each served by an individual gas meter.

Residential New Construction Program

- New homes must be located within the UNSG certificated service territory.

Program Rationale

The pace of residential new construction in Arizona is one of the biggest drivers of UNSG's system load growth. In December 2004 and 2005 the residential sector of the UNSG customer base made up approximately 91% of total accounts and 67% total therm sales. It is useful to offer this type of energy efficiency program as the load will continue to be present on UNSG's system for 50 plus years after initial construction. It is much easier and more cost effective to work with builders to implement energy efficiency at the time of construction rather than attempt retrofit efficiency after a home has been built. For many new home measures such as building envelope improvements, the benefits of energy efficiency upgrades will be sustained for the life of the home to produce cost effective savings.

Program Objectives

- Reduce peak demand and overall energy consumption (gas and electric) in new homes;
- Incorporate EPA/DOE Energy Star Homes® performance standards into the program;
- Stimulate construction of new homes that are inspected and tested to assure energy performance;
- Stimulate the installation of high SEER (14 or greater) air conditioning units and heat pumps for cooling climates;
- Stimulate the installation of high AFUE (90% or greater) furnaces in heating climates;
- Stimulate the installation of high efficiency water heaters;
- Stimulate the installation of Energy Star® products;
- Achieve an annual participation of between 8% and 12% of new home units, with approximately 402 homes in 2008;
- Assist sales agents with promoting and selling of energy efficient homes;
- Provide information to help explain the benefits of energy efficient features;
- Train builder construction staff and sub-contractors in advanced building science concepts to increase energy efficiency through improved design and installation practices;
- Increase homebuyer awareness and understanding of the benefits they receive from energy efficient building practices; and
- Educate builders who: 1) are not familiar with savings potential; 2) may be uncertain about performance associated with energy efficient construction standards; 3) may be concerned about high first costs for construction measures.

Products and Services

- Promotion of builders and subdivisions that meet or exceed Energy Star® performance standards;
- Builder and sub-contractor education and training;
- Educational and promotional materials for builders and new home buyers; and
- Builder incentives for meeting Energy Star Homes® performance standards.

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Figure 1: Energy Smart Homes Program Prescriptive Incentives

UES Energy Smart Home Program Incentives	
Meets ESH and Energy Star Homes® performance standards including testing and inspection protocol.	\$400 per home

Delivery Strategy and Administration

UNSG will provide program administration, marketing, planning, coordination of builder and contractor training and consumer education activities. Some program activities, such as training, incentive processing, and other program support may be provided in-house or through specialized vendors.

Key industry relationships will include: (1) EPA/DOE Energy Star Homes® for program branding and certification standards; (2) building Science trainers for training and education; (3) testing and inspection contractors approved by RESNET for third party performance verification and energy ratings; (4) the Arizona Energy Office for support in all areas; and (5) local code officials.

UNSG will develop key trade ally relationships including: (1) builders; (2) energy experts able to provide design assistance and building energy simulation modeling; (3) HVAC Contractors for sizing, installation and start-up of HVAC systems; (4) framing Contractors for framing and blocking detail to enhance insulation performance; and (5) insulation Contractors for insulation installed according to specifications.

Program logic model is included in Appendix 4.

Marketing and Communications

The goal for marketing the ESH is to educate consumers on the benefits of Energy Star Home® performance standards and promote builders who provide Energy Star Home® products. Marketing is necessary to drive the consumers to homebuilders who adhere to these performance standards. As more consumers demand the product, more builders will choose to build to ESH standards. Higher participation by builders results in higher quality and more energy efficient homes being built in the UNSG service territory.

UNSG will provide the following marketing and promotional support:

For Builders:

- Advertisements and article placements in builder trade publications;
- Direct sales through builder account representatives;
- Point-of-Sale materials and sales tools;
- UNSG Web-site; and
- UNSG builder training events.

For Homebuyers:

- Advertisement or articles in targeted homebuyer publications;
- UNSG Web-site;
- Point-of-Sale materials at sales offices and model homes; and

Residential New Construction Program

- Brochures or bill-stuffers.

Program Implementation Schedule

The following table shows the estimated timeline for key program activities by quarter assuming program approval by the ACC by the third quarter of 2007:

Figure 2: Implementation Schedule

Program Activities	2007				2008				2009			
New program pre-approval submit												
New program approval (estimated)												
Develop marketing materials & communication												
Program kick-off with Energy Star Home® and builders (On-going)												
Training for builders and partners												
Savings verification												
Program redesign as needed												

Monitoring and Evaluation Plan

UNSG will adopt a strategy that calls for integrated data collection that is designed to provide a quality data resource for program tracking, management and evaluation. This approach will entail the following primary activities:

- **Database tracking system development** - As part of detailed program design, UNSG will develop a database tracking system that will be used to collect the necessary data elements and provide the reporting functions needed to track program process and provide a data resource for program evaluation.
- **Integrated implementation data collection** - UNSG will work with the implementation contractor to establish systems to collect the data needed to support effective program management and evaluation through the implementation and customer application processes. The database tracking system will be integrated with implementation data collection processes.
- **Field verification** - UNSG will conduct field verification of the installation of a sample of measures throughout the implementation of the program.
- **Tracking of savings using deemed savings values** - UNSG will develop deemed savings values for each measure and technology promoted by the program and periodically review and revise the savings values to be consistent with program participation and accurately estimated the savings being achieved by the program.

This approach will provide UNSG with ongoing feedback on program progress and enable program management to adjust or correct the program so as to be more effective, provide a higher level of service, and be more cost beneficial. Integrated data collection will also provide a high quality data resource for evaluation activities.

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Program Budget

The average annual ESH annual budget of \$446,000 will be allocated as shown in Table 1, while Table 2 provides the expected program budgets through 2012. Appendix 3 provides additional details on the 2008 budget. It is expected that the nature of the construction market in the UNSG service territory and the absence of past energy efficiency initiatives will result in high marketing and administrative costs. On average over the life of the program, incentives are expected to account for 49% of the total budget.

Table 1. 2008 Program Budget

Total Program Budget	\$420,000
Total Administrative and O&M Cost Allocation	
Managerial & Clerical	\$62,748
Travel & Direct Expenses	\$3,780
Overhead	\$9,072
Total Administrative Cost	\$75,600
Total Marketing Allocation	
Internal Marketing Expense	\$42,000
Subcontracted Marketing Expense	\$42,000
Total Marketing Cost	\$84,000
Total Direct Implementation	
Financial Incentives	\$161,312
Support Activity Labor	\$36,540
Hardware & Materials	\$33,568
Rebate Processing & Inspection	\$12,180
Total Direct Installation Cost	\$243,600
Total EM&V Cost Allocation	
EM&V / Research Activity	\$15,120
EM&V Overhead	\$1,680
Total EM&V Cost	\$16,800

Table 2. 2008 – 2012 Program Budget

Year	2008	2009	2010	2011	2012
Total Budget	\$420,000	\$432,600	\$445,578	\$458,945	\$472,714
Incentives	\$161,312	\$195,624	\$219,280	\$265,144	\$249,264
Administrative Costs	\$258,688	\$236,976	\$226,298	\$193,801	\$223,450
Incentives as % of Budget	38%	45%	49%	58%	53%

Estimated Energy Savings

Total annual participation goals and energy savings are presented in Table 3. The program expects, on average, 545 units annually will participate in the program. Appendix 5 provides further information about estimated energy savings.

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Table 3. Residential Air Conditioning Program Annual Energy Savings

Year	2008	2009	2010	2011	2012
Projected Number of Permits	5,041	5,434	5,482	6,026	5,193
Projected ESH Program %	8%	9%	10%	11%	12%
Projected ESH participants	403	489	548	663	623
Coincident peak savings (kW)	304	369	414	500	470
Energy Savings (kWh)	18,703	22,681	25,424	30,742	28,900
Energy Savings (therms)	119,048	144,371	161,829	195,676	183,957

As a result of the energy savings shown above, it is estimated that the program will produce environmental benefits through avoided emissions and avoided water use. The estimated additional benefits from 2008 – 2012 are presented in Table 4.

Table 4. Projected Environmental Benefits, 2008 - 2012

CO ₂ Emissions Avoided	4,807	Tons
Water Saved	29,463	Gal

Note: A portion of the CO₂, and all of the water benefits are related to electricity savings and are based on Arizona Public Service Co. estimates as presented in the "APS Demand Side Management Program Portfolio 2005-2007" p. 20.

Program Benefits and Costs

Reports from Ecos Consulting and Summit Blue Consulting include comprehensive and updated analysis on the expected savings gained from ESH standards compared to current market conditions and building practices. The majority of new home activity is expected in UNSG Mohave County which was the focus of the Ecos report. The analysis shows the expected kW demand savings, expected energy savings and therm savings from using higher efficiency heating, cooling and water heating equipment. The analysis also includes the reduction in energy and demand created by performance requirements during construction when homes are inspected and/or tested. Information from the Mohave County results will be applied to the warm weather regions of UNSG service territory. Data collected in this baseline report was then expanded to include energy simulations for Flagstaff climate data to be applied to the cold weather regions of UNSG service territory.

Results of the 2007 analysis provide the basis for the energy and capacity savings used for the benefit cost analysis and the summary table from the ECOS study and the Summit Blue study are included in Appendix 2. UNSG will continue to monitor current conditions and will update the analysis if additional changes are necessary.

Table 5 provides the program costs and benefits, the Total Resource Cost ("TRC") test, the Societal Cost ("SC") test and the Ratepayer Impact Measure ("RIM"). Savings are net based on 0.95 net-to-gross ratio. A detailed benefit/cost analysis is presented in Appendix 5.

Table 5. Benefit-cost analysis results

Cost Effectiveness Tests	TRC	SC	RIM
Benefit/Cost Ratio	2.08	2.74	0.64

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In addition to estimating the savings from each measure, this analysis relies on a range of other assumptions and financial data provided in Table 6.

Table 6. Other Financial Assumptions

Conservation Life (yrs)	20
Program Life (yrs)	5
Energy AC (\$/Therm)	0.9451
Ratio of Non-inc to Incentive Costs	75.4%
TRC Discount Rate	8.50%
Social Discount Rate	5.00%
NTG Ratio	95%

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Appendix 1 - Energy Star Home® Requirements by Climate Zone

Article I. - Builder Option Packages for Arizona

Find Your County and Click on the Corresponding Climate Zone

County	BOPs by Climate Zone	County	BOPs by Climate Zone
Apache	<u>5</u>	Mohave	<u>3</u>
Cochise	<u>3</u>	Navajo	<u>5</u>
Coconino	<u>5</u>	Pima	<u>2</u>
Gila	<u>4</u>	Pinal	<u>2</u>
Graham	<u>3</u>	Santa Cruz	<u>3</u>
Greenlee	<u>3</u>	Yavapai	<u>4</u>
La Paz	<u>2</u>	Yuma	<u>2</u>
Maricopa	<u>2</u>		

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UNS Gas serves Coconino, Mohave, Santa Cruz, and Yavapai Counties.

Continue to next pages for detail

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ENERGY STAR Qualified Homes Builder Option Package Notes

2004/2006 IECC Climate Zone¹ – 5

ENERGY STAR Window Zone¹⁰ – Northern

The requirements for the ENERGY STAR Builder Option Package (BOP) are specified in the table below.

To qualify as ENERGY STAR using this BOP, a home must meet the requirements specified, be verified and field-tested in accordance with the HERS Standards by a RESNET-accredited Provider, and meet all applicable codes.

Cooling Equipment (Where Provided)	Right-sized ² ≥13 SEER/ 11.5 EER ENERGY STAR qualified A/C; <u>OR</u> Right-sized ² ≥13 SEER/ 11.5 EER/ 8.5 HSPF ENERGY STAR qualified heat pump ³
Heating Equipment	≥90 AFUE ENERGY STAR qualified gas furnace; <u>OR</u> ≥13 SEER/ 11.5 EER/ 8.5 HSPF ENERGY STAR qualified heat pump ^{2,3} ; <u>OR</u> ≥90 AFUE ENERGY STAR qualified boiler; <u>OR</u> ≥85 AFUE ENERGY STAR qualified oil furnace
Thermostat ³	ENERGY STAR qualified thermostat (except for zones with mass radiant heat)
Ductwork	Leakage ⁴ : ≤ 4 cfm to outdoors / 100 sq. ft.; <u>AND</u> Insulation ⁵ : ≥ R-6 insulation on ducts in unconditioned spaces
Envelope	≤ 5 ACH50 Infiltration ^{6,7}
	<div style="display: flex;"> <div style="flex: 1;"> ≤ Reference UA ≥ 38 R-Value ≥ 30 R-Value ≥ 19 R-Value ≥ 13 + 5 R-Value ≥ 30 R-Value ≥ 10 R-Value ≥ 13 R-Value ≥ 10 R-Value ≥ 13 R-Value ≥ 10 R-Value </div> <div style="flex: 1;"> UA Alternative Approach ⁸; <u>OR</u> Ceiling Insulation ⁸; <u>AND (if applicable)</u> Cathedral Ceiling Insulation ⁸; <u>AND (if applicable)</u> Wood Frame Wall Insulation ⁸; <u>OR</u> Wood Frame Wall Insulation and Sheathing <u>AND (if applicable)</u> Floor Over Unconditioned Space Insulation ⁸; <u>AND (if applicable)</u> Crawlspace Wall Insulation Continuous ⁸; <u>OR (if applicable)</u> Crawlspace Wall Insulation Framed ⁸; <u>AND (if applicable)</u> Basement Wall Insulation Continuous ⁸; <u>OR (if applicable)</u> Basement Wall Insulation Framed ⁸; <u>AND (if applicable)</u> Slab Insulation at 2 feet Depth ⁸; <u>AND</u> </div> </div>
	Completed Thermal Bypass Inspection Checklist ⁹
Windows ^{10,11,12}	≤ 0.35 U-Value ≤ Any SHGC
Water Heater ¹³	Gas (EF): 40 Gal = 0.61 60 Gal = 0.57 80 Gal = 0.53 Electric (EF): 40 Gal = 0.93 50 Gal = 0.92 80 Gal = 0.89 Oil or Gas ¹⁴ : Integrated with space heating boiler
Lighting and Appliances ^{15,16}	Five or more ENERGY STAR qualified appliances, light fixtures, ceiling fans equipped with lighting fixtures, and/or ventilation fans

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ENERGY STAR Qualified Homes Builder Option Package Notes

2004/2006 IECC Climate Zone¹ – 5

ENERGY STAR Window Zone¹⁰ – Northern

1. The appropriate climate zone shall be determined by the 2004 International Residential Code (IRC), Figure N1101.2.
2. Cooling equipment shall be sized according to the latest editions of ACCA Manuals J and S, ASHRAE 2001 Handbook of Fundamentals, or an equivalent procedure. Maximum oversizing limit for air conditioners and heat pumps is 15% (with the exception of heat pumps in Climate Zones 5 - 8, where the maximum oversizing limit is 25%). The following operating conditions shall be used in the sizing calculations and verified where reviewed by the rater:
Outdoor temperatures shall be the 99.0% design temperatures as published in the ASHRAE Handbook of Fundamentals for the home's location or most representative city for which design temperature data are available. Note that a higher outdoor air design temperature may be used if it represents prevailing local practice by the HVAC industry and reflects extreme climate conditions that can be documented with recorded weather data; Indoor temperatures shall be 75 F for cooling; Infiltration rate shall be selected as "tight", or the equivalent term.
In specifying equipment, the next available size may be used. In addition, indoor and outdoor coils shall be matched in accordance with ARI standards.
3. Homes with heat pumps in Climate Zones 4 and 5 must have an HSPF ≥ 8.5 , which exceeds the ENERGY STAR minimum of 8.2 HSPF. Homes with heat pumps in Climate Zones 6, 7, and 8 cannot be qualified using this BOP, but can earn the label using the ENERGY STAR Performance Path requirements. In homes with heat pumps that have programmable thermostats, the thermostat must have "Adaptive Recovery" technology to prevent the excessive use of electric back-up heating.
4. Ducts must be sealed and tested to be ≤ 4 cfm to outdoors / 100 sq. ft. of conditioned floor area, as determined and documented by a RESNET-certified rater using a RESNET-approved testing protocol. If *total* duct leakage is ≤ 4 cfm to outdoors / 100 sq. ft. of conditioned floor area, then leakage to outdoors does not need to be tested. Duct leakage testing can be waived if all ducts and air handling equipment are located in conditioned space (i.e., within the home's air and thermal barriers) AND the envelope leakage has been tested to be ≤ 3 ACH50 OR ≤ 0.25 CFM 50 per sq. ft. of the building envelope. Note that mechanical ventilation will be required in this situation.
5. EPA recommends, but does not require, locating ducts within conditioned space (i.e., inside the air and thermal barriers), and using a minimum of R-4 insulation for ducts inside conditioned space to prevent condensation.
6. Envelope leakage must be determined by a RESNET-certified rater using a RESNET-approved testing protocol.
7. To ensure consistent exchange of indoor air, whole-house mechanical ventilation is recommended, but not required.
8. Insulation levels of a home must meet or exceed Sections N1102.1 and N1102.2 of the 2004 IRC. These sections allow for compliance to be determined by meeting prescriptive insulation requirements, by using U-factor alternatives, or by using a total UA alternative. These sections also provide guidance and exceptions that may be used. However, note that the U-factor for steel-frame envelope assemblies addressed in Section N1102.2.4 shall be calculated using the ASHRAE zone method, or a method providing equivalent results, and not a series-parallel path calculation method as is stated in the code. Additionally, Section N1102.2.2, which allows for the reduction of ceiling insulation in space constrained roof/ceiling assemblies, shall be limited to 500 sq. ft. or 20% of ceiling area, whichever is less. In all cases, insulation shall be inspected to Grade I installation as defined in the RESNET Standards by a RESNET-certified rater. Note that the fenestration requirements of the 2004 IRC do not apply to the fenestration requirements of the National Builder Option Package. Therefore, if UA calculations are performed, they must use the IRC requirements (with the exception of fenestration) plus the fenestration requirements contained in the national BOP. For more information, refer to the "Codes and Standards Information" document.
9. The Thermal Bypass Inspection Checklist must be completed for homes to earn the ENERGY STAR label. The Checklist requires visual inspection of framing areas where air barriers are commonly missed and inspection of insulation to ensure proper alignment with air barriers, thus serving as an extra check that the air and thermal barriers are continuous and complete.
10. All windows and skylights must be ENERGY STAR qualified or meet all specifications for ENERGY STAR qualified windows. Windows in Climate Zones 2 and 4 must exceed ENERGY STAR specifications (CZ 2: U-value ≤ 0.55 and SHGC ≤ 0.35 ; CZ 4: U-value ≤ 0.40 and SHGC ≤ 0.45). Visit www.energystar.gov/windows for more information on ENERGY STAR qualified windows.

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Residential New Construction Program



ENERGY STAR Qualified Homes Builder Option Package Notes

2004/2006 IECC Climate Zone¹ – 5

ENERGY STAR Window Zone¹⁰ – Northern

11. All decorative glass and skylight window area counts toward the total window area to above-grade conditioned floor area (WFA) ratio. For homes with a WFA ratio >18%, the following additional requirements apply:
 - a. In IRC Climate Zones 1, 2, and 3, an improved window SHGC is required, and is determined by:
Required SHGC = $[0.18 / \text{WFA}] \times [\text{ENERGY STAR SHGC}]$
Where the ENERGY STAR SHGC is the minimum required SHGC of the climate-appropriate window specified in this BOP.
 - b. In IRC Climate Zones 4, 5, 6, 7, and 8, an improved window U-Value is required, and is determined by:
Required U-Value = $[0.18 / \text{WFA}] \times [\text{ENERGY STAR U-Value}]$
Where the ENERGY STAR U-Value is the minimum required U-Value of the climate-appropriate window specified in this BOP.
12. Up to 0.75% WFA may be used for decorative glass that does not meet ENERGY STAR requirements. For example, a home with total above-grade conditioned floor area of 2,000 sq. ft. may have up to 15 sq. ft. (0.75% of 2,000) of decorative glass.
13. To determine domestic hot water (DHW) EF requirements for additional tank sizes, use the following equations:
Gas DHW EF $\geq 0.69 - (0.002 \times \text{Tank Gallon Capacity})$; Electric DHW EF $\geq 0.97 - (0.001 \times \text{Tank Gallon Capacity})$.
14. In homes with gas or oil hydronic space heating, water heating systems must have an efficiency ≥ 0.78 EF. This may be met through the use of an instantaneous water heating system or an indirect storage system with a boiler that has a system efficiency ≥ 85 AFUE. Homes with tankless coil hot water heating systems cannot be qualified using this BOP, but can earn the label using the ENERGY STAR Performance Path requirements.
15. Any combination of ENERGY STAR qualified products listed may be installed to meet this requirement. ENERGY STAR qualified ventilation fans include range hood, bathroom, and inline fans. ENERGY STAR qualified lighting fixtures installed in the following locations shall not be counted: storage rooms (e.g., closets, pantries, sheds), or garages. Eligible appliances include ENERGY STAR qualified refrigerators, dish washers, and washing machines. Further efficiency and savings can be achieved by installing ENERGY STAR qualified products, in addition to those required (e.g., additional lighting, appliances, etc.).
16. Efficient lighting fixtures represent a significant opportunity for persistent energy savings and a meaningful way to differentiate ENERGY STAR qualified homes from those meeting minimum code requirements. In 2008, EPA intends to propose and solicit industry comments on adding the ENERGY STAR Advanced Lighting Package (ALP) as an additional requirement for ENERGY STAR qualified homes in 2009. To learn more about the ALP, refer to www.energystar.gov/homes.

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ENERGY STAR Qualified Homes Builder Option Package Notes

2004/2006 IECC Climate Zone¹ – 4

ENERGY STAR Window Zone¹⁰ – All

The requirements for the ENERGY STAR Builder Option Package (BOP) are specified in the table below.

To qualify as ENERGY STAR using this BOP, a home must meet the requirements specified, be verified and field-tested in accordance with the HERS Standards by a RESNET-accredited Provider, and meet all applicable codes.

Cooling Equipment (Where Provided)	Right-sized ² ≥13 SEER/ 11.5 EER ENERGY STAR qualified A/C; <u>OR</u> Right-sized ² ≥13 SEER/ 11.5 EER/ 8.5 HSPF ENERGY STAR qualified heat pump ³
Heating Equipment	≥90 AFUE ENERGY STAR qualified gas furnace; <u>OR</u> ≥13 SEER/ 11.5 EER/ 8.5 HSPF ENERGY STAR qualified heat pump ^{2,3} ; <u>OR</u> ≥90 AFUE ENERGY STAR qualified boiler; <u>OR</u> ≥85 AFUE ENERGY STAR qualified oil furnace
Thermostat ³	ENERGY STAR qualified thermostat (except for zones with mass radiant heat)
Ductwork	Leakage ⁴ : ≤ 4 cfm to outdoors / 100 sq. ft.; <u>AND</u> Insulation ⁵ : ≥ R-6 insulation on ducts in unconditioned spaces
Envelope	≤ 6 ACH50 Infiltration ^{6,7}
	<div style="display: flex;"> <div style="flex: 1;"> ≤ Reference UA ≥ 38 R-Value ≥ 30 R-Value ≥ 13 R-Value ≥ 19 R-Value ≥ 10 R-Value ≥ 13 R-Value ≥ 10 R-Value ≥ 13 R-Value ≥ 10 R-Value </div> <div style="flex: 2;"> UA Alternative Approach⁸; <u>OR</u> Ceiling Insulation⁸; <u>AND (if applicable)</u> Cathedral Ceiling Insulation⁸; <u>AND (if applicable)</u> Wood Frame Wall Insulation⁸; <u>AND (if applicable)</u> Floor Over Unconditioned Space Insulation⁸; <u>AND (if applicable)</u> Crawlspace Wall Insulation Continuous⁸; <u>OR (if applicable)</u> Crawlspace Wall Insulation Framed⁸; <u>AND (if applicable)</u> Basement Wall Insulation Continuous⁸; <u>OR (if applicable)</u> Basement Wall Insulation Framed⁸; <u>AND (if applicable)</u> Slab Insulation at 2 feet Depth⁸; <u>AND</u> </div> </div>
	Completed Thermal Bypass Inspection Checklist ⁹
Windows ^{10,11,12}	≤ 0.40 U-Value ≤ 0.45 SHGC
Water Heater ¹³	Gas (EF): 40 Gal = 0.61 60 Gal = 0.57 80 Gal = 0.53 Electric (EF): 40 Gal = 0.93 50 Gal = 0.92 80 Gal = 0.89 Oil or Gas ¹⁴ : Integrated with space heating boiler
Lighting and Appliances ^{15,16}	Five or more ENERGY STAR qualified appliances, light fixtures, ceiling fans equipped with lighting fixtures, and/or ventilation fans

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ENERGY STAR Qualified Homes Builder Option Package Notes

2004/2006 IECC Climate Zone¹ – 4

ENERGY STAR Window Zone¹⁰ – All

1. The appropriate climate zone shall be determined by the 2004 International Residential Code (IRC), Figure N1101.2.
2. Cooling equipment shall be sized according to the latest editions of ACCA Manuals J and S, ASHRAE 2001 Handbook of Fundamentals, or an equivalent procedure. Maximum oversizing limit for air conditioners and heat pumps is 15% (with the exception of heat pumps in Climate Zones 5 - 8, where the maximum oversizing limit is 25%). The following operating conditions shall be used in the sizing calculations and verified where reviewed by the rater:
Outdoor temperatures shall be the 99.0% design temperatures as published in the ASHRAE Handbook of Fundamentals for the home's location or most representative city for which design temperature data are available. Note that a higher outdoor air design temperature may be used if it represents prevailing local practice by the HVAC industry and reflects extreme climate conditions that can be documented with recorded weather data; Indoor temperatures shall be 75 F for cooling; Infiltration rate shall be selected as "tight", or the equivalent term.
In specifying equipment, the next available size may be used. In addition, indoor and outdoor coils shall be matched in accordance with ARI standards.
3. Homes with heat pumps in Climate Zones 4 and 5 must have an HSPF ≥ 8.5 , which exceeds the ENERGY STAR minimum of 8.2 HSPF. Homes with heat pumps in Climate Zones 6, 7, and 8 cannot be qualified using this BOP, but can earn the label using the ENERGY STAR Performance Path requirements. In homes with heat pumps that have programmable thermostats, the thermostat must have "Adaptive Recovery" technology to prevent the excessive use of electric back-up heating.
4. Ducts must be sealed and tested to be ≤ 4 cfm to outdoors / 100 sq. ft. of conditioned floor area, as determined and documented by a RESNET-certified rater using a RESNET-approved testing protocol. If *total* duct leakage is ≤ 4 cfm to outdoors / 100 sq. ft. of conditioned floor area, then leakage to outdoors does not need to be tested. Duct leakage testing can be waived if all ducts and air handling equipment are located in conditioned space (i.e., within the home's air and thermal barriers) AND the envelope leakage has been tested to be ≤ 3 ACH50 OR ≤ 0.25 CFM 50 per sq. ft. of the building envelope. Note that mechanical ventilation will be required in this situation.
5. EPA recommends, but does not require, locating ducts within conditioned space (i.e., inside the air and thermal barriers), and using a minimum of R-4 insulation for ducts inside conditioned space to prevent condensation.
6. Envelope leakage must be determined by a RESNET-certified rater using a RESNET-approved testing protocol.
7. To ensure consistent exchange of indoor air, whole-house mechanical ventilation is recommended, but not required.
8. Insulation levels of a home must meet or exceed Sections N1102.1 and N1102.2 of the 2004 IRC. These sections allow for compliance to be determined by meeting prescriptive insulation requirements, by using U-factor alternatives, or by using a total UA alternative. These sections also provide guidance and exceptions that may be used. However, note that the U-factor for steel-frame envelope assemblies addressed in Section N1102.2.4 shall be calculated using the ASHRAE zone method, or a method providing equivalent results, and not a series-parallel path calculation method as is stated in the code. Additionally, Section N1102.2.2, which allows for the reduction of ceiling insulation in space constrained roof/ceiling assemblies, shall be limited to 500 sq. ft. or 20% of ceiling area, whichever is less. In all cases, insulation shall be inspected to Grade I installation as defined in the RESNET Standards by a RESNET-certified rater. Note that the fenestration requirements of the 2004 IRC do not apply to the fenestration requirements of the National Builder Option Package. Therefore, if UA calculations are performed, they must use the IRC requirements (with the exception of fenestration) plus the fenestration requirements contained in the national BOP. For more information, refer to the "Codes and Standards Information" document.
9. The Thermal Bypass Inspection Checklist must be completed for homes to earn the ENERGY STAR label. The Checklist requires visual inspection of framing areas where air barriers are commonly missed and inspection of insulation to ensure proper alignment with air barriers, thus serving as an extra check that the air and thermal barriers are continuous and complete.
10. All windows and skylights must be ENERGY STAR qualified or meet all specifications for ENERGY STAR qualified windows. Windows in Climate Zones 2 and 4 must exceed ENERGY STAR specifications (CZ 2: U-value ≤ 0.55 and SHGC ≤ 0.35 ; CZ 4: U-value ≤ 0.40 and SHGC ≤ 0.45). Visit www.energystar.gov/windows for more information on ENERGY STAR qualified windows.

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ENERGY STAR Qualified Homes Builder Option Package Notes

2004/2006 IECC Climate Zone¹ – 4

ENERGY STAR Window Zone¹⁰ – All

11. All decorative glass and skylight window area counts toward the total window area to above-grade conditioned floor area (WFA) ratio. For homes with a WFA ratio >18%, the following additional requirements apply:
 - a. In IRC Climate Zones 1, 2, and 3, an improved window SHGC is required, and is determined by:
Required SHGC = $[0.18 / \text{WFA}] \times [\text{ENERGY STAR SHGC}]$
Where the ENERGY STAR SHGC is the minimum required SHGC of the climate-appropriate window specified in this BOP.
 - b. In IRC Climate Zones 4, 5, 6, 7, and 8, an improved window U-Value is required, and is determined by:
Required U-Value = $[0.18 / \text{WFA}] \times [\text{ENERGY STAR U-Value}]$
Where the ENERGY STAR U-Value is the minimum required U-Value of the climate-appropriate window specified in this BOP.
12. Up to 0.75% WFA may be used for decorative glass that does not meet ENERGY STAR requirements. For example, a home with total above-grade conditioned floor area of 2,000 sq. ft. may have up to 15 sq. ft. (0.75% of 2,000) of decorative glass.
13. To determine domestic hot water (DHW) EF requirements for additional tank sizes, use the following equations:
Gas DHW EF $\geq 0.69 - (0.002 \times \text{Tank Gallon Capacity})$; Electric DHW EF $\geq 0.97 - (0.001 \times \text{Tank Gallon Capacity})$.
14. In homes with gas or oil hydronic space heating, water heating systems must have an efficiency ≥ 0.78 EF. This may be met through the use of an instantaneous water heating system or an indirect storage system with a boiler that has a system efficiency ≥ 85 AFUE. Homes with tankless coil hot water heating systems cannot be qualified using this BOP, but can earn the label using the ENERGY STAR Performance Path requirements.
15. Any combination of ENERGY STAR qualified products listed may be installed to meet this requirement. ENERGY STAR qualified ventilation fans include range hood, bathroom, and inline fans. ENERGY STAR qualified lighting fixtures installed in the following locations shall not be counted: storage rooms (e.g., closets, pantries, sheds), or garages. Eligible appliances include ENERGY STAR qualified refrigerators, dish washers, and washing machines. Further efficiency and savings can be achieved by installing ENERGY STAR qualified products, in addition to those required (e.g., additional lighting, appliances, etc.).
16. Efficient lighting fixtures represent a significant opportunity for persistent energy savings and a meaningful way to differentiate ENERGY STAR qualified homes from those meeting minimum code requirements. In 2008, EPA intends to propose and solicit industry comments on adding the ENERGY STAR Advanced Lighting Package (ALP) as an additional requirement for ENERGY STAR qualified homes in 2009. To learn more about the ALP, refer to www.energystar.gov/homes.

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ENERGY STAR Qualified Homes Builder Option Package Notes

2004/2006 IECC Climate Zone¹ – 3

ENERGY STAR Window Zone¹⁰ – South/Central

The requirements for the ENERGY STAR Builder Option Package (BOP) are specified in the table below.

To qualify as ENERGY STAR using this BOP, a home must meet the requirements specified, be verified and field-tested in accordance with the HERS Standards by a RESNET-accredited Provider, and meet all applicable codes.

Cooling Equipment (Where Provided)	Right-sized ² ≥ 14 SEER/ 11.5 EER ENERGY STAR qualified A/C; <u>OR</u> Right-sized ² ≥ 14 SEER/ 11.5 EER/ 8.2 HSPF ENERGY STAR qualified heat pump ³
Heating Equipment	≥ 80 AFUE gas furnace; <u>OR</u> ≥ 14 SEER/ 11.5 EER/ 8.2 HSPF ENERGY STAR qualified heat pump ^{2,3} ; <u>OR</u> ≥ 80 AFUE boiler; <u>OR</u> ≥ 80 AFUE oil furnace
Thermostat ³	ENERGY STAR qualified thermostat (except for zones with mass radiant heat)
Ductwork	Leakage ⁴ : ≤ 4 cfm to outdoors / 100 sq. ft.; <u>AND</u> Insulation ⁵ : ≥ R-6 insulation on ducts in unconditioned spaces
Envelope	≤ 6 ACH50 Infiltration ^{6,7}
	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> ≤ Reference UA ≥ 30 R-Value ≥ 30 R-Value ≥ 13 R-Value ≥ 19 R-Value ≥ 5 R-Value ≥ 13 R-Value None required None required None required </div> <div style="width: 50%;"> UA Alternative Approach ⁸; <u>OR</u> Ceiling Insulation ⁸; <u>AND (if applicable)</u> Cathedral Ceiling Insulation ⁸; <u>AND (if applicable)</u> Wood Frame Wall Insulation ⁸; <u>AND (if applicable)</u> Floor Over Unconditioned Space Insulation ⁸; <u>AND (if applicable)</u> Crawlspace Wall Insulation Continuous ⁸; <u>OR (if applicable)</u> Crawlspace Wall Insulation Framed ⁸; <u>AND (if applicable)</u> Basement Wall Insulation Continuous ⁸; <u>OR (if applicable)</u> Basement Wall Insulation Framed ⁸; <u>AND (if applicable)</u> Slab Insulation ⁸; <u>AND</u> </div> </div>
	Completed Thermal Bypass Inspection Checklist ⁹
Windows ^{10,11,12}	≤ 0.40 U-Value ≤ 0.40 SHGC
Water Heater ¹³	Gas (EF): 40 Gal = 0.61 60 Gal = 0.57 80 Gal = 0.53 Electric (EF): 40 Gal = 0.93 50 Gal = 0.92 80 Gal = 0.89 Oil or Gas ¹⁴ : Integrated with space heating boiler
Lighting and Appliances ^{15,16}	Five or more ENERGY STAR qualified appliances, light fixtures, ceiling fans equipped with lighting fixtures, and/or ventilation fans

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ENERGY STAR Qualified Homes Builder Option Package Notes

2004/2006 IECC Climate Zone¹ – 3

ENERGY STAR Window Zone¹⁰ – South/Central

1. The appropriate climate zone shall be determined by the 2004 International Residential Code (IRC), Figure N1101.2.
2. Cooling equipment shall be sized according to the latest editions of ACCA Manuals J and S, ASHRAE 2001 Handbook of Fundamentals, or an equivalent procedure. Maximum oversizing limit for air conditioners and heat pumps is 15% (with the exception of heat pumps in Climate Zones 5 - 8, where the maximum oversizing limit is 25%). The following operating conditions shall be used in the sizing calculations and verified where reviewed by the rater:

Outdoor temperatures shall be the 99.0% design temperatures as published in the ASHRAE Handbook of Fundamentals for the home's location or most representative city for which design temperature data are available. Note that a higher outdoor air design temperature may be used if it represents prevailing local practice by the HVAC industry and reflects extreme climate conditions that can be documented with recorded weather data; Indoor temperatures shall be 75 F for cooling; Infiltration rate shall be selected as "tight", or the equivalent term.

In specifying equipment, the next available size may be used. In addition, indoor and outdoor coils shall be matched in accordance with ARI standards.
3. Homes with heat pumps in Climate Zones 4 and 5 must have an HSPF ≥ 8.5 , which exceeds the ENERGY STAR minimum of 8.2 HSPF. Homes with heat pumps in Climate Zones 6, 7, and 8 cannot be qualified using this BOP, but can earn the label using the ENERGY STAR Performance Path requirements. In homes with heat pumps that have programmable thermostats, the thermostat must have "Adaptive Recovery" technology to prevent the excessive use of electric back-up heating.
4. Ducts must be sealed and tested to be ≤ 4 cfm to outdoors / 100 sq. ft. of conditioned floor area, as determined and documented by a RESNET-certified rater using a RESNET-approved testing protocol. If *total* duct leakage is ≤ 4 cfm to outdoors / 100 sq.ft. of conditioned floor area, then leakage to outdoors does not need to be tested. Duct leakage testing can be waived if all ducts and air handling equipment are located in conditioned space (i.e., within the home's air and thermal barriers) AND the envelope leakage has been tested to be ≤ 3 ACH50 OR ≤ 0.25 CFM 50 per sq. ft. of the building envelope. Note that mechanical ventilation will be required in this situation.
5. EPA recommends, but does not require, locating ducts within conditioned space (i.e., inside the air and thermal barriers), and using a minimum of R-4 insulation for ducts inside conditioned space to prevent condensation.
6. Envelope leakage must be determined by a RESNET-certified rater using a RESNET-approved testing protocol.
7. To ensure consistent exchange of indoor air, whole-house mechanical ventilation is recommended, but not required.
8. Insulation levels of a home must meet or exceed Sections N1102.1 and N1102.2 of the 2004 IRC. These sections allow for compliance to be determined by meeting prescriptive insulation requirements, by using U-factor alternatives, or by using a total UA alternative. These sections also provide guidance and exceptions that may be used. However, note that the U-factor for steel-frame envelope assemblies addressed in Section N1102.2.4 shall be calculated using the ASHRAE zone method, or a method providing equivalent results, and not a series-parallel path calculation method as is stated in the code. Additionally, Section N1102.2.2, which allows for the reduction of ceiling insulation in space constrained roof/ceiling assemblies, shall be limited to 500 sq. ft. or 20% of ceiling area, whichever is less. In all cases, insulation shall be inspected to Grade I installation as defined in the RESNET Standards by a RESNET-certified rater. Note that the fenestration requirements of the 2004 IRC do not apply to the fenestration requirements of the National Builder Option Package. Therefore, if UA calculations are performed, they must use the IRC requirements (with the exception of fenestration) plus the fenestration requirements contained in the national BOP. For more information, refer to the "Codes and Standards Information" document.
9. The Thermal Bypass Inspection Checklist must be completed for homes to earn the ENERGY STAR label. The Checklist requires visual inspection of framing areas where air barriers are commonly missed and inspection of insulation to ensure proper alignment with air barriers, thus serving as an extra check that the air and thermal barriers are continuous and complete.
10. All windows and skylights must be ENERGY STAR qualified or meet all specifications for ENERGY STAR qualified windows. Windows in Climate Zones 2 and 4 must exceed ENERGY STAR specifications (CZ 2: U-value ≤ 0.55 and SHGC ≤ 0.35 ; CZ 4: U-value ≤ 0.40 and SHGC ≤ 0.45). Visit www.energystar.gov/windows for more information on ENERGY STAR qualified windows.

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ENERGY STAR Qualified Homes Builder Option Package Notes

2004/2006 IECC Climate Zone¹ – 3

ENERGY STAR Window Zone¹⁰ – South/Central

11. All decorative glass and skylight window area counts toward the total window area to above-grade conditioned floor area (WFA) ratio. For homes with a WFA ratio >18%, the following additional requirements apply:
 - a. In IRC Climate Zones 1, 2, and 3, an improved window SHGC is required, and is determined by:
Required SHGC = $[0.18 / \text{WFA}] \times [\text{ENERGY STAR SHGC}]$
Where the ENERGY STAR SHGC is the minimum required SHGC of the climate-appropriate window specified in this BOP.
 - b. In IRC Climate Zones 4, 5, 6, 7, and 8, an improved window U-Value is required, and is determined by:
Required U-Value = $[0.18 / \text{WFA}] \times [\text{ENERGY STAR U-Value}]$
Where the ENERGY STAR U-Value is the minimum required U-Value of the climate-appropriate window specified in this BOP.
12. Up to 0.75% WFA may be used for decorative glass that does not meet ENERGY STAR requirements. For example, a home with total above-grade conditioned floor area of 2,000 sq. ft. may have up to 15 sq. ft. (0.75% of 2,000) of decorative glass.
13. To determine domestic hot water (DHW) EF requirements for additional tank sizes, use the following equations:
Gas DHW EF $\geq 0.69 - (0.002 \times \text{Tank Gallon Capacity})$; Electric DHW EF $\geq 0.97 - (0.001 \times \text{Tank Gallon Capacity})$.
14. In homes with gas or oil hydronic space heating, water heating systems must have an efficiency ≥ 0.78 EF. This may be met through the use of an instantaneous water heating system or an indirect storage system with a boiler that has a system efficiency ≥ 85 AFUE. Homes with tankless coil hot water heating systems cannot be qualified using this BOP, but can earn the label using the ENERGY STAR Performance Path requirements.
15. Any combination of ENERGY STAR qualified products listed may be installed to meet this requirement. ENERGY STAR qualified ventilation fans include range hood, bathroom, and inline fans. ENERGY STAR qualified lighting fixtures installed in the following locations shall not be counted: storage rooms (e.g., closets, pantries, sheds), or garages. Eligible appliances include ENERGY STAR qualified refrigerators, dish washers, and washing machines. Further efficiency and savings can be achieved by installing ENERGY STAR qualified products, in addition to those required (e.g., additional lighting, appliances, etc.).
16. Efficient lighting fixtures represent a significant opportunity for persistent energy savings and a meaningful way to differentiate ENERGY STAR qualified homes from those meeting minimum code requirements. In 2008, EPA intends to propose and solicit industry comments on adding the ENERGY STAR Advanced Lighting Package (ALP) as an additional requirement for ENERGY STAR qualified homes in 2009. To learn more about the ALP, refer to www.energystar.gov/homes.

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Appendix 2 – Energy Simulation Used For Benefit-Cost Analysis – warm weather regions.

Table 5. Estimated Current Construction Practice and Savings Potential with SEER 13 Baseline

Location and Number of Homes		Annual Cooling Usage (MWh)		Annual Cooling Demand (kW)		Annual Heating Usage (Therms)	
Kingman and North Mohave County	# of Homes	Per Home (kWh)	Total	Per Home	Total	Per Home	Total
Current Building Practice	200,000	6,826	1,365,200	5.14	1,028,000	326	65,200,000
UES Efficient Home Specification/ENERGY STAR	200,000	4,271	854,200	3.49	698,000	188	37,600,000
Savings: MWh, kW, Therms		2,555	511,000	1.65	330,000	138	27,600,000
Location and Number of Homes		Annual Cooling Usage (MWh)		Annual Cooling Demand (kW)		Annual Heating Usage (Therms)	
Lake Havasu City area	# of Homes	Per Home (kWh)	Total	Per Home	Total	Per Home	Total
Current Building Practice	10,000	8,974	89,740	5.43	59,500	71	710,000
UES Efficient Home Specification/ENERGY STAR	10,000	5,651	56,510	3.82	38,000	34	340,000
Savings: MWh, kW, Therms		3,323	34,960	2.15	21,500	37	370,000
Location and Number of Homes		Annual Cooling Usage (MWh)		Annual Cooling Demand (kW)		Annual Heating Usage (Therms)	
Totals for all Mohave County	# of Homes	Per Home (kWh)	Total	Per Home	Total	Per Home	Total
Current Building Practice	210,000	n/a	1,454,940	n/a	1,087,500	397	65,910,000
UES Efficient Home Specification/ENERGY STAR	210,000	n/a	910,710	n/a	736,000	222	37,940,000
Savings: MWh, kW, Therms		n/a	544,230	n/a	351,500	175	27,970,000

*Above savings calculations were based upon the following assumptions (see also Appendices E):

- Current Building Practice = SEER 13, 20% duct leakage, .65 U-value and .55 SHGC window (better low-e value in Lake Havasu City), R-13 or R-19 with R-4 foam board wall, R-30 ceiling
- UES Efficient Home Specification = SEER 14 AC, 10% duct leakage, .35 U-value and .40 SHGC window, R-13 or R-19 with R-4 foam board wall, R-38 ceiling, thermal bypass sealing

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Summit Blue modeling parameters

S.no	Fixed Parameters	Value	Unit	Model Parameters
1	Location	Kingman,Az	-	
2	Storey	1	-	
3	Slab on grade base	-	-	
4	Exterior wall finish	Stucco	-	
5	Roof	Tile, some asphalt shingles	-	
6	Attic Insulation	R - 30	-	
7	Floor insulation	Slab Floor, no Insulation	-	
8	Wall insulation	R23(R19 batt R4 board)	-	
9	Wall insulation	R17(R13 batt + R4 board)	-	R16 + R4 board
10	Duct insulation	R 4.2	-	
11	Duct insulation Rhodes	R 6	-	
12	Ceiling Insulation	R-12	-	R24
13	Window	Aluminum framed, double paned	-	
14	Window material	metal + vinyl	-	
15	Window U value	0.5 average.	-	0.3
16	Low E Kingman	30 % all homes,average value is 0.6	SHGC	0.45
17	Low E lake H	65 % all homes average 0.48	SHGC	
18	Gas furnace	0.78	AFUE	90 AFUE
19	Split AC	10	SEER	13 SEER
20	Cooling supply air temperature	57	F	
21	Conditioned Area	1941	sq. ft.	
22	Duct leakage	13	%	2
S.no	Parameters in enovity report (not fixed)	Value	Unit	
1	Ceiling height	9	ft	
2	Ceiling construction	Gable	-	
3	Ceiling finish	tile over plywood	-	
4	Floor	Concrete slab	-	
5	Infiltration	0.45	ACH	0.22ACH
6	Perimeter Insulation	None	-	
7	Window area	278 (equal all 4 directions)	sq. ft.	
8	Door construction	Steel/fiberglass insulated	-	
9	Door Area	50	sq. ft.	
10	Door R value	R 2.6	-	
11	Door U value	0.385		
12	rooms	4	-	
13	Outside Air ventilation	60	cfm	
14	Thermostat summer	75	F	
15	Thermostat winter	72	F	
16	Occupancy	4	-	
17	Peak Internal loading	1.7	KW	

Residential New Construction Program

18	Domestic hot water heater	Gas	-	
19	Peak flow	7.7	gallons	
20	Energy factor	0.9	-	
21	Natural ventilation	none	-	60 cfm
S.no	Other Parameters	Value	Unit	
	As in calibrated model			
1	Zones	5 (4perimeter + 1 core)	-	
2	Daylight controls	None	-	
3	Building orientation	North	-	
4	Aspect ratio	1	-	
5	Perimeter zone depth	10	ft	
6	Attic above top floor	-	-	
7	Floor construction	6 in. concrete	in.	
8	Interior finish	Carpet with fiber pad	-	
9	Exterior wall	2 X 6 frame, wood	-	
10	Overhangs or fins	None	-	
11	Blinds / drapes	None	-	
12	Skylit rooftop zones	None	-	
13	Occupancy schedule	Typical, daytime unoccupied		
14	Mon - fri	Leave 7, Return 5	-	
15	Weekend, holiday	Leave 9, return 4	-	
16	Activity Area Allocation			
17	Residential (Single family)	85	%	
18	Storage	8	%	
19	Laundry	7	%	
20	Lighting density	1.5	W/sq. ft.	
21	Electric equipment load			
22	Living area	1	W/sq. ft.	
23	Laundry	3	W/sq. ft.	
24	Exterior Lighting Loads			

Residential New Construction Program

Appendix 3 – Expected 2008 Program Costs

Budget Items	Budget	Allocation Rate (%)
Administrative		
Managerial and Clerical Labor	\$62,748	
Labor - Clerical	\$3,137	5.0%
Labor - Program Design	\$5,020	8.0%
Labor - Program Development	\$5,020	8.0%
Labor - Program Planning	\$6,275	10.0%
Labor - Program/Project Management	\$5,647	9.0%
Labor - Staff Management	\$6,275	10.0%
Labor - Staff Supervision	\$3,137	5.0%
Subcontractor Labor - Clerical	\$3,137	5.0%
Subcontractor Labor - Program Design	\$6,275	10.0%
Subcontractor Labor - Program Development	\$3,137	5.0%
Subcontractor Labor - Program Planning	\$3,137	5.0%
Subcontractor Labor - Program/Project Management	\$12,550	20.0%
Subcontractor Labor - Staff Management	\$0	0.0%
Subcontractor Labor - Staff Supervision	\$0	0.0%
<i>Subtotal Managerial and Clerical Labor</i>	<i>\$62,748</i>	<i>100.0%</i>
Travel & Direct Expenses	\$3,780	
Conference Fees	\$1,134	30.0%
Labor - Conference Attendance	\$756	20.0%
Subcontractor - Conference Fees	\$76	2.0%
Subcontractor - Travel - Airfare	\$151	4.0%
Subcontractor - Travel - Lodging	\$0	0.0%
Subcontractor - Travel - Meals	\$0	0.0%
Subcontractor - Travel - Mileage	\$0	0.0%
Subcontractor - Travel - Parking	\$0	0.0%
Subcontractor - Travel - Per Diem for Misc. Expenses	\$302	8.0%
Subcontractor Labor - Conference Attendance	\$76	2.0%
Travel - Airfare	\$529	14.0%
Travel - Lodging	\$227	6.0%
Travel - Meals	\$113	3.0%
Travel - Mileage	\$38	1.0%
Travel - Parking	\$0	0.0%
Travel - Per Diem for Misc. Expenses	\$378	10.0%
<i>Travel & Direct Expenses</i>	<i>\$3,780</i>	<i>100.0%</i>
Overhead (General and Administrative) - Labor and Materials	\$9,072	
Equipment - Communications	\$181	2.0%
Equipment - Computing	\$181	2.0%
Equipment - Document Reproduction	\$181	2.0%
Equipment - General Office	\$181	2.0%
Equipment - Transportation	\$181	2.0%
Facilities - Lease/Rent Payment	\$0	0.0%

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Labor - Accounts Payable	\$91	1.0%
Labor - Accounts Receivable	\$91	1.0%
Labor - Administrative	\$91	1.0%
Labor - Automated Systems	\$0	0.0%
Labor - Communications	\$91	1.0%
Labor - Contract Reporting	\$91	1.0%
Labor - Corporate Services	\$91	1.0%
Labor - Facilities Maintenance	\$91	1.0%
Labor - Information Technology	\$91	1.0%
Labor - Materials Management	\$91	1.0%
Labor - Procurement	\$91	1.0%
Labor - Regulatory Reporting	\$3,629	40.0%
Labor - Shop Services	\$91	1.0%
Labor - Telecommunications	\$91	1.0%
Labor - Transportation Services	\$91	1.0%
Office Supplies	\$91	1.0%
Postage	\$91	1.0%
Subcontractor - Equipment - Communications	\$0	0.0%
Subcontractor - Equipment - Computing	\$0	0.0%
Subcontractor - Equipment - Document Reproduction	\$0	0.0%
Subcontractor - Equipment - General Office	\$0	0.0%
Subcontractor - Equipment - Transportation	\$0	0.0%
Subcontractor - Facilities - Lease/Rent Payment	\$0	0.0%
Subcontractor - Office Supplies	\$0	0.0%
Subcontractor - Postage	\$0	0.0%
Subcontractor Labor - Accounts Payable	\$0	0.0%
Subcontractor Labor - Accounts Receivable	\$0	0.0%
Subcontractor Labor - Administrative	\$0	0.0%
Subcontractor Labor - Automated Systems	\$0	0.0%
Subcontractor Labor - Communications	\$0	0.0%
Subcontractor Labor - Contract Reporting	\$0	0.0%
Subcontractor Labor - Corporate Services	\$0	0.0%
Subcontractor Labor - Facilities Maintenance	\$0	0.0%
Subcontractor Labor - Information Technology	\$0	0.0%
Subcontractor Labor - Materials Management	\$0	0.0%
Subcontractor Labor - Procurement	\$0	0.0%
Subcontractor Labor - Regulatory Reporting	\$3,175	35.0%
Subcontractor Labor - Shop Services	\$0	0.0%
Subcontractor Labor - Telecommunications	\$0	0.0%
Subcontractor Labor - Transportation Services	\$0	0.0%
Subtotal Overhead	\$9,072	100.0%
Total Administrative Costs	\$75,600	
Marketing/Advertising/Outreach		
Internal Marketing Expense	\$42,000	
Advertisements / Media Promotions	\$10,500	25.0%
Bill Inserts	\$1,680	4.0%
Brochures	\$2,520	6.0%
Door Hangers	\$0	0.0%
Labor - Business Outreach	\$2,100	5.0%
Labor - Customer Outreach	\$2,100	5.0%

Residential New Construction Program

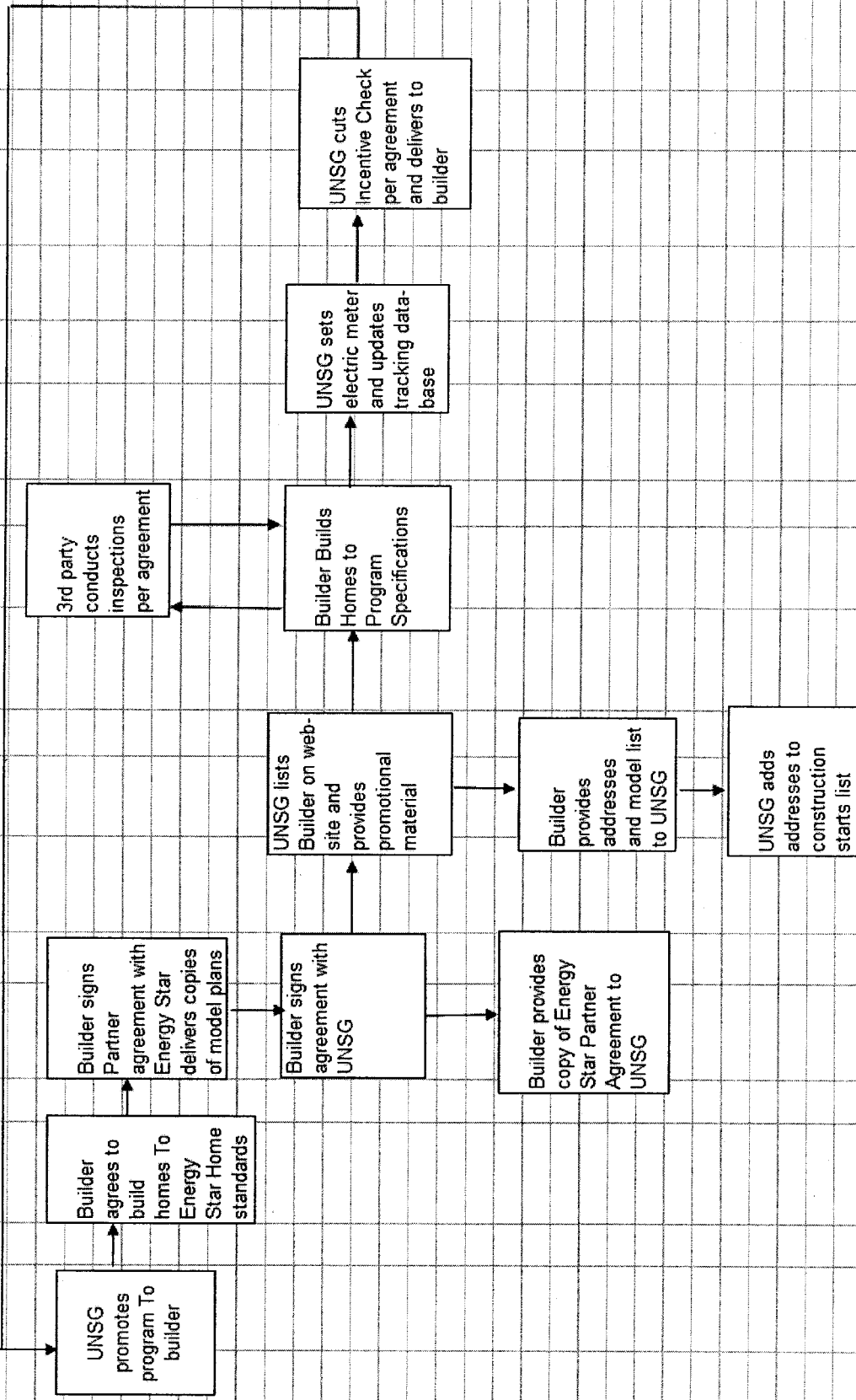
Labor - Customer Relations	\$2,100	5.0%
Labor - Marketing	\$12,600	30.0%
Print Advertisements	\$6,300	15.0%
Radio Spots	\$2,100	5.0%
<i>Subtotal Internal Marketing Expense</i>	<i>\$42,000</i>	<i>100.0%</i>
Subcontracted Marketing Expense	\$42,000	
Subcontractor - Bill Inserts	\$2,100	5.0%
Subcontractor - Brochures	\$2,100	5.0%
Subcontractor - Door Hangers	\$0	0.0%
Subcontractor - Print Advertisements	\$0	0.0%
Subcontractor - Radio Spots	\$4,200	10.0%
Subcontractor - Television Spots	\$0	0.0%
Subcontractor Labor - Business Outreach	\$2,100	5.0%
Subcontractor Labor - Customer Outreach	\$2,100	5.0%
Subcontractor Labor - Customer Relations	\$2,100	5.0%
Subcontractor Labor - Marketing	\$2,100	5.0%
Television Spots	\$0	0.0%
Website Development	\$25,200	60.0%
<i>Subtotal Subcontracted Marketing Expense</i>	<i>\$42,000</i>	<i>100.0%</i>
Total Marketing/Advertising/Outreach	\$84,000	
Direct Implementation		
Financial Incentives to Customers	\$161,312	
Activity - Labor	\$36,540	
Labor - Curriculum Development	\$2,923	8.0%
Labor - Customer Education and Training	\$14,616	40.0%
Labor - Customer Equipment Testing and Diagnostics	\$0	0.0%
Labor - Facilities Audits	\$10,962	30.0%
Subcontractor Labor - Facilities Audits	\$3,654	10.0%
Subcontractor Labor - Curriculum Development	\$1,827	5.0%
Subcontractor Labor - Customer Education and Training	\$1,827	5.0%
Subcontractor Labor - Customer Equipment Testing and Diagnostics	\$731	2.0%
<i>Subtotal Activity</i>	<i>\$36,540</i>	<i>100.0%</i>
Hardware and Materials - Installation and Other DI Activity	\$33,568	
Audit Applications and Forms	\$2,685	8.0%
Direct Implementation Literature	\$6,714	20.0%
Education Materials	\$6,714	20.0%
Energy Measurement Tools	\$3,357	10.0%
Installation Hardware	\$3,357	10.0%
Subcontractor - Direct Implementation Literature	\$1,343	4.0%
Subcontractor - Education Materials	\$1,343	4.0%
Subcontractor - Energy Measurement Tools	\$5,371	16.0%
Subcontractor - Installation Hardware	\$2,014	6.0%
Subcontractor - Audit Applications and Forms	\$671	2.0%
<i>Subtotal Hardware and Materials</i>	<i>\$33,568</i>	<i>100.0%</i>
Rebate Processing and Inspection - Labor and Materials	\$12,180	
Labor - Field Verification	\$1,218	10.0%
Labor - Rebate Processing	\$0	0.0%
Labor - Site Inspections	\$1,218	10.0%
Rebate Applications	\$0	0.0%

Residential New Construction Program

Subcontractor - Rebate Applications	\$1,218	10.0%
Subcontractor Labor - Field Verification	\$2,436	20.0%
Subcontractor Labor - Rebate Processing	\$3,654	30.0%
Subcontractor Labor - Site Inspections	\$2,436	20.0%
<i>Subtotal Rebate Processing and Inspection</i>	<i>\$12,180</i>	<i>100.0%</i>
Total Direct Implementation	\$243,600	
Evaluation, Measurement and Verification		
EM&V Labor and Materials	\$15,120	
Labor - EM&V	\$756	5.0%
Materials - EM&V	\$756	5.0%
Subcontractor Labor - EM&V	\$13,608	90.0%
<i>Subtotal EM&V Activity - Labor</i>	<i>\$15,120</i>	<i>100.0%</i>
EM&V Overhead	\$1,680	
Benefits - EM&V Labor	\$0	0.0%
Overhead - EM&V	\$840	50.0%
Subcontractor Overhead - EM&V	\$0	0.0%
Subcontractor Travel - EM&V	\$0	0.0%
Travel - EM&V	\$840	50.0%
<i>Subtotal EM&V Overhead</i>	<i>\$1,680</i>	<i>100.0%</i>
Total EM&V	\$16,800	
Total Budget	\$420,000	

Residential New Construction Program

Appendix 4 - Program Implementation Model



Residential New Construction Program

Appendix 5 -- Home Level Energy Savings and Benefit/Cost Analysis

ESH101 -- NEW HOME CONSTRUCTION

Energy Smart Homes Program

PROGRAM DATA				RATE DATA				OPERATING DATA				OTHER FACTORS			
Conservation Life (yrs):	20			Rate:				Coincidence Factor:	77%			Line Loss Factor:	10.69%	New	Incremental
Program Life (yrs):	5			\$/kW:			0.00					Application			
Demand AC (\$/kW):	64.94			\$/kWh, On-Peak:			0.12277					Cost Basis:			
Summer Energy AC (\$/kWh):	0.07314			\$/kWh, Off-Peak:			0.09466								
Winter Energy AC (\$/kWh):	0.07075			\$/Therm			1.40080								
Levelized Therms	0.94510														
Ratio of Non-inc to Incentive Costs	104.46%														
IRP Discount Rate****:	8.50%														
Social Discount Rate	5.00%														
NTG Ratio:	95%														

DEMAND/ENERGY SAVINGS										INCENTIVE CALCULATIONS										CUSTOMER COST/SAVINGS				WGT.		% Incent		
Measure Type	Current Practices		Current Practices		Current Practices		Current Practices		Current Practices		Non-Coincident Demand		Non-Coincident Demand		Non-Coincident Demand		Non-Coincident Demand		Non-Coincident Demand		Incr. Cost Savings	Cost Savings w/Inc.	Payback w/Inc.	NPV	Weighting Factor			
	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Cooling	Heating	Heating	Heating	Heating	Heating	Heating	Heating	
Gas Heat and DHW @ 13 SEER	872	0	3.18	1007.0	0	0	826	0	2.20	711.8	0.980	46	0.00	295	3030	3990	400	13%	1454	1575	1091.00	419	2.6	1.6	1.00			37%
Weighted Average											0.98	46	0	295	\$3,030	\$3,990	400	13%	1454	1575	1091	419	2.6	1.6	1.00			37%

See worksheet 'Energy Assumptions' for information of E-Quest modeling parameters and energy savings data.
See worksheet 'Cost Assumptions' for information of cost data.
Avoided electric costs represent UNSE / TEP simple cycle
Retail electric rates are APS E-12 average revenue/kwh, no BSC, TY Sept 2005

Efficient Home Heating Program

Attachment 3

Efficient Home Heating Program

Efficient Home Heating Program

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Efficient Home Heating Program

UNSG Efficient Home Heating Program

Program Concept and Description

This program promotes the installation of high-efficiency gas-fueled furnaces in existing homes in UNSG's service region. The program promotes the selection of Energy Star qualified high-efficiency equipment that meet or exceed the minimum Energy Star standard of 90% Annual Fuel Utilization Efficiency ("AFUE"). Incentives for the purchase of qualifying high-efficiency equipment are paid directly to homeowners. Any contractor may install or provide qualifying equipment to UNSG customers.

UNSG will provide consumer education on the benefits of qualifying equipment and will promote the program through UNSG promotional events, the UNSG website, and print advertising.

Target Market

The program is targeted at UNSG customers with central gas-fueled air furnace heating systems who are in the market to replace their existing furnace.

Current Baseline Conditions

The average lifetime of residential heating equipment is approximately 15 years, and it is estimated that most of the equipment that will be installed under this program will be in place of a standard 80% efficient furnace.

Program Eligibility

The program is available to all UNSG residential customers with central gas-fueled air furnace heating systems. All brands of equipment that meet the minimum performance standards are eligible for the program. Homeowners are eligible for the incentive for purchasing qualifying high-efficiency equipment.

Program Rationale

Space heating is an important end use in UNSG's high country climate. UNSG's residential customers can realize savings on their energy bills through the installation of high-efficiency furnaces.

Efficient Home Heating Program

Program Objectives

The objective of the program is to promote the purchase of Energy Star qualified high-efficiency furnaces that meet or exceed the minimum Energy Star standard of 90% AFUE.

Products and Services

The products and services provided by the program include:

- Incentives to homeowners for the installation of qualifying high-efficiency furnaces. Incentives and qualifying criteria are summarized in Table 1.

Table 1. Incentives Schedule

Measure	Qualifying Criteria	Average Incentive*
High Efficiency Furnaces	Minimum AFUE of 90%	\$382
Packaged Air Conditioners with High-efficiency Furnaces	90 AFUE or better furnace with CEE Tier 1 or 2 AC rating	\$516
*Incentives will vary depending on unit heating capacity and efficiency. Note: Consortium for Energy Efficiency ("CEE") is an independent rating agency.		

- Education and promotional efforts designed to inform customers about the benefits of high-efficiency heating systems including educational brochures, program promotional material, and UNSG website content.

Delivery Strategy and Administration

The strategy for program delivery and administration is as follows:

- The program will be managed in-house by UNSG staff;
- UNSG will provide overall program management, marketing, planning and coordination of customer and contractor participation tracking and technical support and evaluation;
- Key partnering relationships will include:
 - Heating training professionals;
 - Heating contractors trained in program procedures; and
 - The Arizona Energy Office to provide training, education and awareness.

Program implementation flow chart is included in Appendix 1.

Marketing and Communications

The marketing and communications strategy will include the following components:

Efficient Home Heating Program

- UNSG will provide program marketing and customer awareness-building through a range of strategies including:
 - Promotions on the UNSG website about the benefits of purchasing high-efficiency heating equipment;
 - Advertising in major newspapers and other selected print media in the UNSG service region to raise awareness of the availability of the program;
 - Providing information through UNSG's customer care center;
 - Developing marketing pieces including brochures and other collateral pieces to promote the benefits of qualifying heating equipment; and
 - Assistance with responding to customer inquiries about the program, and how to purchase qualifying heating equipment.
- The advertising campaign will communicate that high-efficiency heating systems will help reduce customer energy bills, provide equal or better comfort conditions, and are beneficial for the environment.

Program Implementation Schedule

Table 2 shows the estimated timeline for key program activities by quarter.

Table 2. Implementation Schedule

Program Activities	2007				2008				2009			
New Program submitted to ACC for approval												
Program approval (estimated)												
Create marketing materials and campaign												
Conduct contractor training												
Conduct program promotions and marketing												
Program implementation and delivery												
Process evaluation												
Measure verification and impact evaluation												
Redesign design program as needed												

Measurement, Evaluation and Research Plan

UNSG will adopt a strategy that calls for integrated data collection that is designed to provide a quality data resource for program tracking, management and evaluation. This approach will entail the following primary activities:

- **Database tracking system development.** As part of detailed program design, UNSG will develop a database tracking system that will be used to collect the necessary data elements and provide the reporting functions needed to track program process and provide a data resource for program evaluation.
- **Integrated implementation data collection.** UNSG will establish systems to collect the data needed to support effective program management and evaluation through the implementation and customer application processes. The database tracking system will be integrated with implementation data collection processes.
- **Field verification.** UNSG will conduct field verification of the installation of a sample of measures throughout the implementation of the program.
- **Tracking of savings using deemed savings values.** UNSG will develop deemed savings values for each measure and technology promoted by the program and

Efficient Home Heating Program

periodically review and revise the savings values to be consistent with program participation and accurately estimated the savings being achieved by the program.

This approach will provide UNSG with ongoing feedback on program progress and enable program management to adjust or correct the program so as to be more effective, provide a higher level of service, and be more cost beneficial. Integrated data collection will also provide a high quality data resource for evaluation activities.

Program Budget

The average annual budget of approximately \$425,000 will be allocated as shown in Table 3, while Table 4 provides the expected program budgets through 2012. Appendix 2 provides additional details on the 2008 budget.

Table 3. 2008 Program Budget

Total Program Budget	\$400,000
Total Administrative and O&M Cost Allocation	
Managerial & Clerical	\$57,600
Travel & Direct Expenses	\$8,640
Overhead	\$5,760
Total Administrative Cost	\$72,000
Total Marketing Allocation	
Internal Marketing Expense	\$24,000
Subcontracted Marketing Expense	\$24,000
Total Marketing Cost	\$48,000
Total Direct Implementation	
Financial Incentives	\$218,400
Support Activity Labor	\$10,400
Hardware & Materials	\$5,200
Rebate Processing & Inspection	\$26,000
Total Direct Installation Cost	\$260,000
Total EM&V Cost Allocation	
EM&V / Research Activity	\$19,000
EM&V Overhead	\$1,000
Total EM&V Cost	\$20,000

Table 4. 2008 – 2012 Program Budget

Year	2008	2009	2010	2011	2012
Total Budget	\$400,000	\$412,000	\$424,360	\$437,091	\$450,204
Incentives	\$218,400	\$231,874	\$238,830	\$253,338	\$268,501
Administrative Costs	\$181,600	\$180,126	\$185,530	\$183,753	\$181,702
Incentives as % of Budget	54.6%	56.3%	56.3%	58.0%	59.6%

Estimated Energy Savings

Total annual participation goals and energy savings are presented in Table 5. The program expects, on average, 3,000 units annually will participate in the program, with approximately

Efficient Home Heating Program

80% of these being furnaces with an AFUE rating of 90% or better, and the balance comprised of packaged units with 90% AFUE furnaces and CEE tier 1 or 2 air conditioning ratings. Appendix 3 provides further information about estimated energy savings, including the measure and program level benefit cost analysis.

Table 5. Residential Air Conditioning Program Annual Energy Savings

Year	2008	2009	2010	2011	2012
Number of Expected Participating Units	3,009	3,099	3,192	3,287	3,386
Coincident peak savings (kW)	330	340	351	361	372
Energy Savings (kWh)	407,113	419,326	431,906	444,863	458,209
Energy Savings (therms)	677,838	698,173	719,118	740,692	762,912

As a result of the energy savings shown above, it is estimated that the program will produce environmental benefits through avoided emissions and avoided water use. The estimated additional benefits from 2008 – 2012 are presented in Table 6.

Table 6. Projected Environmental Benefits, 2008 - 2012

CO ₂ Emissions Avoided	22,224	Tons
Water Saved	503,610	Gal

Note: A portion of the CO₂, and all of the water benefits are related to electricity savings and are based on Arizona Public Service Co. estimates as presented in the "APS Demand Side Management Program Portfolio 2005-2007" p. 20.

Program Cost Effectiveness

The cost effectiveness of furnace replacements and the program was assessed using the Total Resource Cost ("TRC") test, the Societal Cost ("SC") test and the Ratepayer Impact Measure ("RIM") test. Measure analysis worksheets showing all energy savings, cost and cost-effectiveness calculations are included in Appendix 3.

The cost effectiveness analysis requires estimation of:

- net energy savings attributable to the program;
- net incremental cost to the customer of purchasing qualifying equipment;
- UNSG's program administration costs;
- the present value of program benefits including UNSG avoided costs over the life of the measures; and
- UNSG lost revenues.

Table 7 provides a summary of the benefit/cost analysis results for this program. A detailed benefit/cost analysis is presented in Appendix 3.

Efficient Home Heating Program

Table 7. Benefit-cost analysis results

Cost Effectiveness Tests	TRC	SC	RIM
Benefit/Cost Ratio	1.46	1.82	0.37

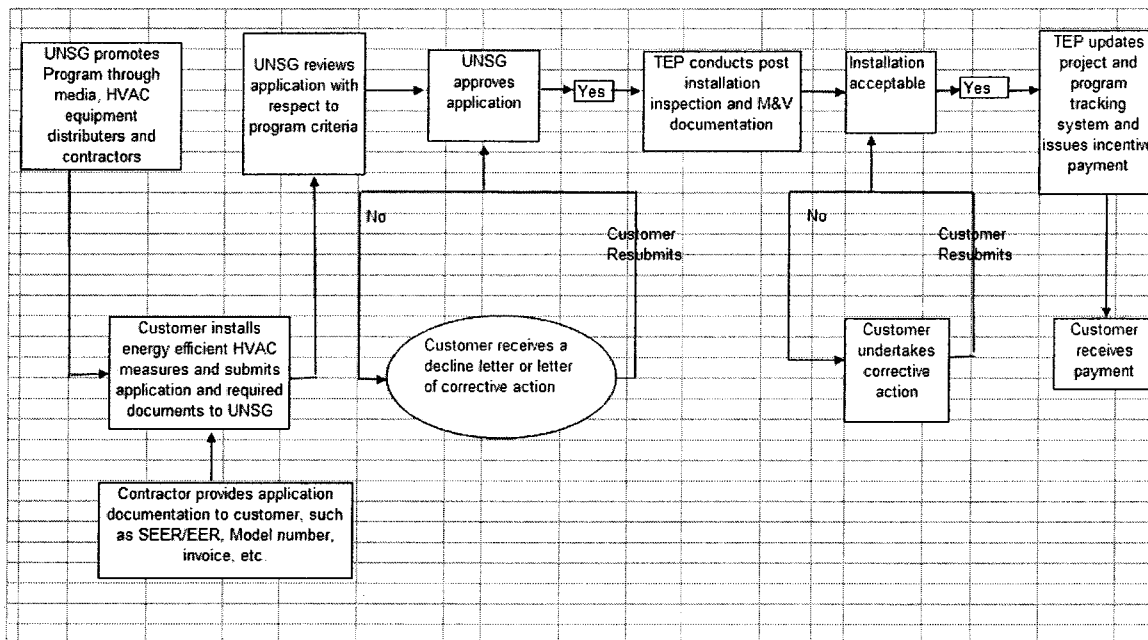
In addition to estimating the savings from each measure, this analysis relies on a range of other assumptions and financial data provided in Figure 8.

Table 8. Other Financial Assumptions

Conservation Life (yrs):	15
Program Life (yrs):	5
Energy AC (\$/Therm):	0.9194
Ratio of Non-inc to Incentive Costs	75.4%
TRC Discount Rate	8.50%
Social Discount Rate	5.00%
NTG Ratio:	64%

Efficient Home Heating Program

Appendix 1 – Efficient Home Heating Program Implementation Plan



Efficient Home Heating Program

Appendix 2 – Expected 2008 Program Costs

Budget Items	Budget	Allocation Rate (%)
Administrative		
Managerial and Clerical Labor	\$57,600	
Labor - Clerical	\$2,880	5.0%
Labor - Program Design	\$2,880	5.0%
Labor - Program Development	\$2,880	5.0%
Labor - Program Planning	\$8,640	15.0%
Labor - Program/Project Management	\$5,760	10.0%
Labor - Staff Management	\$5,760	10.0%
Labor - Staff Supervision	\$2,880	5.0%
Subcontractor Labor - Clerical	\$2,880	5.0%
Subcontractor Labor - Program Design	\$5,760	10.0%
Subcontractor Labor - Program Development	\$2,880	5.0%
Subcontractor Labor - Program Planning	\$2,880	5.0%
Subcontractor Labor - Program/Project Management	\$11,520	20.0%
Subcontractor Labor - Staff Management	\$0	0.0%
Subcontractor Labor - Staff Supervision	\$0	0.0%
<i>Subtotal Managerial and Clerical Labor</i>	<i>\$57,600</i>	<i>100.0%</i>
Travel & Direct Expenses	\$8,640	
Conference Fees	\$864	10.0%
Labor - Conference Attendance	\$864	10.0%
Subcontractor - Conference Fees	\$173	2.0%
Subcontractor - Travel - Airfare	\$346	4.0%
Subcontractor - Travel - Lodging	\$173	2.0%
Subcontractor - Travel - Meals	\$173	2.0%
Subcontractor - Travel - Mileage	\$173	2.0%
Subcontractor - Travel - Parking	\$173	2.0%
Subcontractor - Travel - Per Diem for Misc. Expenses	\$778	9.0%
Subcontractor Labor - Conference Attendance	\$173	2.0%
Travel - Airfare	\$1,210	14.0%
Travel - Lodging	\$864	10.0%
Travel - Meals	\$432	5.0%
Travel - Mileage	\$432	5.0%
Travel - Parking	\$259	3.0%
Travel - Per Diem for Misc. Expenses	\$1,555	18.0%
<i>Travel & Direct Expenses</i>	<i>\$8,640</i>	<i>100.0%</i>
Overhead (General and Administrative) - Labor and Materials	\$5,760	
Equipment - Communications	\$115	2.0%
Equipment - Computing	\$115	2.0%
Equipment - Document Reproduction	\$115	2.0%
Equipment - General Office	\$115	2.0%
Equipment - Transportation	\$115	2.0%
Facilities - Lease/Rent Payment	\$0	0.0%
Labor - Accounts Payable	\$58	1.0%
Labor - Accounts Receivable	\$58	1.0%
Labor - Administrative	\$58	1.0%

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Labor - Automated Systems	\$0	0.0%
Labor - Communications	\$58	1.0%
Labor - Contract Reporting	\$58	1.0%
Labor - Corporate Services	\$58	1.0%
Labor - Facilities Maintenance	\$58	1.0%
Labor - Information Technology	\$58	1.0%
Labor - Materials Management	\$58	1.0%
Labor - Procurement	\$58	1.0%
Labor - Regulatory Reporting	\$2,304	40.0%
Labor - Shop Services	\$58	1.0%
Labor - Telecommunications	\$58	1.0%
Labor - Transportation Services	\$58	1.0%
Office Supplies	\$58	1.0%
Postage	\$58	1.0%
Subcontractor - Equipment - Communications	\$0	0.0%
Subcontractor - Equipment - Computing	\$0	0.0%
Subcontractor - Equipment - Document Reproduction	\$0	0.0%
Subcontractor - Equipment - General Office	\$0	0.0%
Subcontractor - Equipment - Transportation	\$0	0.0%
Subcontractor - Facilities - Lease/Rent Payment	\$0	0.0%
Subcontractor - Office Supplies	\$0	0.0%
Subcontractor - Postage	\$0	0.0%
Subcontractor Labor - Accounts Payable	\$0	0.0%
Subcontractor Labor - Accounts Receivable	\$0	0.0%
Subcontractor Labor - Administrative	\$0	0.0%
Subcontractor Labor - Automated Systems	\$0	0.0%
Subcontractor Labor - Communications	\$0	0.0%
Subcontractor Labor - Contract Reporting	\$0	0.0%
Subcontractor Labor - Corporate Services	\$0	0.0%
Subcontractor Labor - Facilities Maintenance	\$0	0.0%
Subcontractor Labor - Information Technology	\$0	0.0%
Subcontractor Labor - Materials Management	\$0	0.0%
Subcontractor Labor - Procurement	\$0	0.0%
Subcontractor Labor - Regulatory Reporting	\$2,016	35.0%
Subcontractor Labor - Shop Services	\$0	0.0%
Subcontractor Labor - Telecommunications	\$0	0.0%
Subcontractor Labor - Transportation Services	\$0	0.0%
<i>Subtotal Overhead</i>	<i>\$5,760</i>	<i>100.0%</i>
Total Administrative Costs	\$72,000	
Marketing/Advertising/Outreach		
Internal Marketing Expense	\$24,000	
Advertisements / Media Promotions	\$6,000	25.0%
Bill Inserts	\$960	4.0%
Brochures	\$1,440	6.0%
Door Hangers	\$0	0.0%
Labor - Business Outreach	\$1,200	5.0%
Labor - Customer Outreach	\$1,200	5.0%
Labor - Customer Relations	\$1,200	5.0%
Labor - Marketing	\$7,200	30.0%
Print Advertisements	\$3,600	15.0%

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Radio Spots	\$1,200	5.0%
<i>Subtotal Internal Marketing Expense</i>	<i>\$24,000</i>	<i>100.0%</i>
Subcontracted Marketing Expense	\$24,000	
Subcontractor - Bill Inserts	\$1,200	5.0%
Subcontractor - Brochures	\$1,200	5.0%
Subcontractor - Door Hangers	\$0	0.0%
Subcontractor - Print Advertisements	\$0	0.0%
Subcontractor - Radio Spots	\$2,400	10.0%
Subcontractor - Television Spots	\$0	0.0%
Subcontractor Labor - Business Outreach	\$1,200	5.0%
Subcontractor Labor - Customer Outreach	\$1,200	5.0%
Subcontractor Labor - Customer Relations	\$1,200	5.0%
Subcontractor Labor - Marketing	\$1,200	5.0%
Television Spots	\$0	0.0%
Website Development	\$14,400	60.0%
<i>Subtotal Subcontracted Marketing Expense</i>	<i>\$24,000</i>	<i>100.0%</i>
Total Marketing/Advertising/Outreach	\$48,000	
Direct Implementation		
Financial Incentives to Customers	\$218,400	
Activity - Labor	\$10,400	
Labor - Curriculum Development	\$832	8.0%
Labor - Customer Education and Training	\$4,160	40.0%
Labor - Customer Equipment Testing and Diagnostics	\$0	0.0%
Labor - Facilities Audits	\$3,120	30.0%
Subcontractor Labor - Facilities Audits	\$1,040	10.0%
Subcontractor Labor - Curriculum Development	\$520	5.0%
Subcontractor Labor - Customer Education and Training	\$520	5.0%
Subcontractor Labor - Customer Equipment Testing and Diagnostics	\$208	2.0%
<i>Subtotal Activity</i>	<i>\$10,400</i>	<i>100.0%</i>
Hardware and Materials - Installation and Other DI Activity	\$5,200	
Audit Applications and Forms	\$416	8.0%
Direct Implementation Literature	\$1,040	20.0%
Education Materials	\$1,040	20.0%
Energy Measurement Tools	\$520	10.0%
Installation Hardware	\$520	10.0%
Subcontractor - Direct Implementation Literature	\$208	4.0%
Subcontractor - Education Materials	\$208	4.0%
Subcontractor - Energy Measurement Tools	\$832	16.0%
Subcontractor - Installation Hardware	\$312	6.0%
Subcontractor - Audit Applications and Forms	\$104	2.0%
<i>Subtotal Hardware and Materials</i>	<i>\$5,200</i>	<i>100.0%</i>
Rebate Processing and Inspection - Labor and Materials	\$26,000	
Labor - Field Verification	\$2,600	10.0%
Labor - Rebate Processing	\$0	0.0%
Labor - Site Inspections	\$2,600	10.0%
Rebate Applications	\$0	0.0%
Subcontractor - Rebate Applications	\$2,600	10.0%
Subcontractor Labor - Field Verification	\$5,200	20.0%
Subcontractor Labor - Rebate Processing	\$7,800	30.0%

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Subcontractor Labor - Site Inspections	\$5,200	20.0%
<i>Subtotal Rebate Processing and Inspection</i>	<i>\$26,000</i>	<i>100.0%</i>
Total Direct Implementation	\$260,000	
Evaluation, Measurement and Verification		
EM&V Labor and Materials	\$19,000	
Labor - EM&V	\$950	5.0%
Materials - EM&V	\$950	5.0%
Subcontractor Labor - EM&V	\$17,100	90.0%
<i>Subtotal EM&V Activity - Labor</i>	<i>\$19,000</i>	<i>100.0%</i>
EM&V Overhead	\$1,000	
Benefits - EM&V Labor	\$0	0.0%
Overhead - EM&V	\$500	50.0%
Subcontractor Overhead - EM&V	\$0	0.0%
Subcontractor Travel - EM&V	\$0	0.0%
Travel - EM&V	\$500	50.0%
<i>Subtotal EM&V Overhead</i>	<i>\$1,000</i>	<i>100.0%</i>
Total EM&V	\$20,000	
Total Budget	\$400,000	

See accompanying Excel spreadsheet for 2008-2012 program budgets.

Efficient Home Heating Program

Appendix 3 – Measure Level Energy Savings and Benefit/Cost Analysis
Measure level spreadsheet for program benefit/cost calculations available electronically upon request.

Measure level spreadsheet for program benefit/cost calculations available electronically upon request.

PROGRAM DATA		OPERATING DATA		OTHER FACTORS	
Conservation Life (yrs):	15	Htg. Season Hrs.:	2460	Application	R
Program Life (yrs):	5	Htg. Season Load Factor:	0.75	Cost Basis:	Incremental equipm
Levelized Therms	0.91941				
Ratio of Non-inc to Incentive Costs	75.4%				
IRP Discount Rate*****:	8.50%				
Social Discount Rate	5.00%				
NTG Ratio:	60%				

DEMAND/ENERGY SAVINGS										INCENTIVE CALCULATIONS					CUSTOMER COST/SAVINGS					WGT.	% Inc.
Measure Type	Size	Base Model Capacity (Btuh)	Base Eff.	High Eff. (Therms)	Annual Savgs.	IRP PV Benefit (\$)	Social PV Benefit (\$)	Recommended Incentive		PV Program Cost (\$)	NPV (\$)	Incr. Cost (\$)	Cost Savings (\$)	Payback		Weighting Factor	%				
								(\$)	% PV					wo/Inc. (yrs)	w/Inc. (yrs)						
HI-E FURNACE	0 - 60 MBH	60000	0.80	0.90	154	\$704	\$880	\$300	43%	\$585	\$119	\$598	\$216	2.8	1.4	0.25	5				
HI-E FURNACE	61 - 120 MBH	90000	0.80	0.90	231	\$1,056	\$1,320	\$350	33%	\$676	\$381	\$686	\$325	2.1	1.0	0.30	5				
HI-E FURNACE	120+ MBH	135000	0.80	0.90	346	\$1,585	\$1,981	\$400	25%	\$794	\$791	\$820	\$487	1.7	0.9	0.07	4				
HI-E FURNACE	0 - 60 MBH	60000	0.80	0.92	180	\$827	\$1,033	\$400	48%	\$689	\$137	\$646	\$254	2.5	1.0	0.15	6				
HI-E FURNACE	61 - 120 MBH	90000	0.80	0.92	271	\$1,240	\$1,550	\$450	36%	\$808	\$432	\$782	\$381	2.1	0.9	0.10	5				
HI-E FURNACE	120+ MBH	135000	0.80	0.92	406	\$1,860	\$2,325	\$500	27%	\$946	\$914	\$949	\$572	1.7	0.8	0.03	5				
HI-E FURNACE	0 - 60 MBH	60000	0.80	0.94	206	\$944	\$1,180	\$500	53%	\$877	\$67	\$834	\$290	2.9	1.2	0.05	6				
HI-E FURNACE	61 - 120 MBH	90000	0.80	0.94	309	\$1,416	\$1,770	\$550	39%	\$941	\$475	\$877	\$435	2.0	0.8	0.03	6				
HI-E FURNACE	120+ MBH	120000	0.80	0.94	412	\$1,888	\$2,360	\$600	32%	\$1,099	\$789	\$1,078	\$580	1.9	0.8	0.02	5				
Weighted Average					225.98	\$1,035	\$1,294	\$382	\$0	\$711	\$324	\$706	\$318	2.32	1.07	1.00	5				

Htg Season Hrs based on Kingman at 3212 HDD

**** See worksheet 'Cost Assumptions' for information of cost data.

***** Discount rate is based on TEP estimate 12/31/2006

Efficient Home Heating Program

RGHV200 - ENERGY-EFFICIENT PACKAGED HEAT AND AIR CONDITIONERS - RESIDENTIAL

PROGRAM DATA										RATE DATA				OPERATING DATA										OTHER FACTORS							
Conservation Life (yrs): 15 Program Life (yrs): 5 Demand AC (\$/kW): 61.99 Summer On-peak Energy AC (\$/kWh): 0.07218 Summer Off-peak Energy AC (\$/kWh): 0.07218 Winter On-peak Energy AC (\$/kWh): 0.06945 Winter Off-peak Energy AC (\$/kWh): 0.06945 Levelized Terms: 0.91941 Ratio Non-incent to Incent Cost: 75.4% IRP Discount Rate****: 8.50% Social Discount Rate: 5.00% NTG Ratio: 80%										Rate Class: Res Ave \$/kW: 0.000 \$/kWh, On-Peak: 0.12277 \$/kWh, Off-Peak: 0.09466 \$/Therm: 1.40800				On-Pk EFLH: 937 Off-Pk EFLH: 234 On-Pk Ratio: 80.0% Off-Pk Ratio: 20.0% Summer Ratio: 50% Winter Ratio: 50% Coincidence Factor: 0.95 Htg. Season Hrs.: 2460 Htg. Season Load Factor: 0.77										Line Loss Factor: 10.69% Application: ROB, NEW Cost Basis: Incremental MARKET DISTRIBUTION CEE Tier AFUE Market % 1 0.907 75% 2 0.907 20% 1 0.921 3% 2 0.921 2%							
HEATING ENERGY AND COOLING DEMAND / ENERGY SAVINGS																		INCENTIVE CALCULATIONS						CUSTOMER COSTS/SAVINGS						WGCT	
Unit	Size (Tons)	Min. Qual. SEER	Min. Qual. EER	Base Capacity (Btuh)	Base Eff.	High Eff.	Annual Savgs. Per Unit (Therms)	Demand Savings Per Unit (kW)	On-peak Savings Per Unit (kWh)	Off-peak Savings Per Unit (kWh)	PV Benefit Per Unit (\$)	Social PV Benefit Per Unit (\$)	PV Cost Per Unit (\$)	NPV Per Unit (\$)	Cost Savings w/Inc. (yrs)	Cost Payback w/Inc. (yrs)	Weighting Factor	% Incent	TRC												
Less than 5.4 tons	2	13.0	11.3	60,000	0.80	0.90	152	0	397	99	1371	1714	350	26%	1176	196	272	4.2	2.9	0.167	31%	1.17									
90 - 92 AFUE	2.5	13.0	11.3	70,000	0.80	0.90	178	1	496	124	1637	2046	400	24%	1298	339	323	3.9	2.6	0.167	32%	1.26									
CEE Tier 1	3	13.0	11.3	80,000	0.80	0.90	203	1	595	149	1802	2378	450	24%	1441	462	373	3.7	2.5	0.167	33%	1.32									
	3.5	13.0	11.3	90,000	0.80	0.90	228	1	695	173	2168	2709	500	23%	1581	587	423	3.6	2.4	0.167	33%	1.37									
	4	13.0	11.3	100,000	0.80	0.90	254	1	794	198	2433	3041	550	23%	1656	777	473	3.3	2.1	0.167	35%	1.47									
	5.4	13.0	11.3	120,000	0.80	0.90	304	1	1,072	268	3052	3815	750	25%	2012	1041	508	3.1	1.8	0.167	41%	1.52									
Weighted Average		13.00	11.30	86,707	0.80	0.90	219.9	0.7	675	169	2095	2619	500	24%	1528	567	438	3.6	2.4	1.000	35%	1.37									
Less than 5.4 tons	2	14.0	11.6	60,000	0.80	0.90	152	0	448	112	1429	1766	400	28%	1288	141	280	4.4	3.0	0.167	32%	1.11									
90 - 92 AFUE	2.5	14.0	11.6	70,000	0.80	0.90	178	1	560	140	1708	2135	450	26%	1427	281	332	4.1	2.7	0.167	33%	1.20									
CEE Tier 2	3	14.0	11.6	80,000	0.80	0.90	203	1	673	168	1988	2485	500	25%	1568	420	384	3.9	2.6	0.167	34%	1.27									
	3.5	14.0	11.6	90,000	0.80	0.90	228	1	785	196	2268	2835	550	24%	1714	554	462	3.7	2.5	0.167	34%	1.32									
	4	14.0	11.6	100,000	0.80	0.90	254	1	897	224	2548	3184	600	24%	1796	752	488	3.4	2.2	0.167	36%	1.42									
	5.4	14.0	11.6	120,000	0.80	0.90	304	1	1,211	302	3207	4008	800	25%	2142	1065	606	3.2	1.9	0.167	42%	1.50									
Weighted Average		14.00	11.60	86,667	0.80	0.90	220	1	762	190	2191	2739	550	25%	1656	536	421	3.8	2.5	1.000	35%	1.32									
Less than 5.4 tons	2	13.0	11.3	60,000	0.80	0.92	180	0	397	99	1541	1926	450	29%	1462	79	311	4.5	3.1	0.167	32%	1.05									
92+ AFUE	2.5	13.0	11.3	70,000	0.80	0.92	210	1	496	124	1834	2293	500	27%	1618	216	368	4.2	2.9	0.167	32%	1.13									
CEE Tier 1	3	13.0	11.3	80,000	0.80	0.92	240	1	595	149	2128	2660	550	26%	1797	330	425	4.1	2.8	0.167	32%	1.18									
	3.5	13.0	11.3	90,000	0.80	0.92	270	1	695	173	2421	3027	600	25%	1973	448	482	3.9	2.7	0.167	32%	1.23									
	4	13.0	11.3	100,000	0.80	0.92	300	1	794	198	2715	3394	650	24%	2084	631	538	3.7	2.5	0.167	33%	1.30									
	5.4	13.0	11.3	110,000	0.80	0.92	330	1	1,072	268	3207	4009	850	27%	2523	685	621	3.8	2.4	0.167	36%	1.27									
Weighted Average		13.00	11.30	85,000	0.80	0.92	255	0.7	675	169	2308	2885	600	26%	1910	398	458	4.0	2.7	1.000	35%	1.21									
Less than 5.4 tons	2	14.0	11.6	60,000	0.80	0.92	180	0	448	112	1598	1997	500	31%	1587	11	319	4.7	3.2	0.167	33%	1.01									
92+ AFUE	2.5	14.0	11.6	70,000	0.80	0.92	210	1	560	140	1906	2382	550	29%	1764	142	378	4.5	3.0	0.167	33%	1.08									
CEE Tier 2	3	14.0	11.6	80,000	0.80	0.92	240	1	673	168	2214	2767	600	27%	1941	273	436	4.3	2.9	0.167	33%	1.14									
	3.5	14.0	11.6	90,000	0.80	0.92	270	1	785	196	2522	3152	650	26%	2124	398	2042	495	4.1	2.8	0.167	32%	1.19								
	4	14.0	11.6	100,000	0.80	0.92	300	1	897	224	2830	3537	700	25%	2242	588	2143	553	3.9	2.6	0.167	33%	1.26								
	5.4	14.0	11.6	110,000	0.80	0.92	330	1	1,211	302	3382	4202	900	27%	2669	893	2489	642	3.9	2.5	0.167	36%	1.26								
Weighted Average		14.00	11.60	85,000	0.80	0.92	255	1	762	190	2405	3006	650	27%	2054	351	470	4.2	2.8	1.000	33%	1.17									

Attachment 4

C&I Facilities Gas Efficiency Program

C&I Facilities Gas Efficiency Program

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UNSG C&I Facilities Gas Efficiency Program

Program Concept and Description

The C&I Facilities Gas Efficiency Program provides prescriptive incentives for the installation of high-efficiency gas-fueled equipment and systems including space heating, service and domestic water heating, and commercial food service equipment. Prescriptive incentives are offered for a schedule of measures in each of these categories. The schedule of measures and incentives is provided in the following sections.

The viability of each of the prescriptive measures has been assessed through a cost-effectiveness analysis according to the Total Resource Cost ("TRC"), Ratepayer Impact Measure ("RIM") and Societal Cost ("SC") tests. The cost-effectiveness tests account for the energy (therm) savings of each measure, the associated avoided costs and net benefits to UNSG, the customer incremental or installed costs, and the program administration costs.

The program includes consumer educational and promotional pieces designed to assist facility operators and decision makers with the information necessary to improve the energy efficiency of gas-fueled space systems in their facilities. The program includes customer and trade ally education to assist with understanding of what technologies are being promoted, what incentives are offered, and how the program functions.

Appendix 1 provides a program implementation process.

Program Objectives

The primary goal of the program is to encourage UNSG's non-residential customers to install energy efficiency measures in gas-fueled systems in existing facilities. More specifically, the program is designed to:

- Provide incentives to facility operators for the installation of high-efficiency gas fueled space heating, service and domestic water heating, and commercial food service equipment (see Table 1 for the schedule of measures and incentives);
 - Overcome market barriers including:
 - Lack of awareness and knowledge about the benefits and cost of energy efficiency improvements;
 - Performance uncertainty associated with energy efficient equipment;
 - Higher first costs for energy efficient equipment;
 - Assure that the participation process is clear, easy to understand and simple; and
 - Increase the awareness and knowledge of facility operators, managers and decision-makers on the benefits of high-efficiency equipment and systems.
-

Program Rationale

Certain barriers exist to the adoption of energy efficiency measures including lack of investment capital, competition for funds with other capital improvements, lack of awareness/knowledge about the benefits

C&I Facilities Gas Efficiency Program

and costs of energy efficiency measures, high transaction and information search costs, and technology performance uncertainties. This program is designed to help overcome these market barriers and encourage greater adoption of energy efficiency measures in gas-fueled systems in customer facilities.

In addition to helping customers reduce and manage their energy costs, this program provides other societal and customer benefits including reduced greenhouse gas emissions, improved levels of service from energy expenditures, and lower overall rates and energy costs compared to other resource options.

Target Market and Eligibility Requirements

All non-residential customers in the UNSG service region that receive natural gas service from UNSG are eligible to participate in the program. Existing systems that are being replaced on burnout or prior to failure/early retirement and systems installed during new construction projects are all eligible for the program. Applications will be reviewed by UNSG to determine that the facility is within the UNSG service region, the proposed equipment meets energy efficiency standards to qualify for incentive payments and that all necessary specifications are provided to determine the energy impact after installation.

Estimate of Baseline Conditions

UNSG had not conducted a formal baseline study of the existing non-residential market for gas-fueled equipment and systems. However, in preparing the analysis of each of the measures included in this plan, the baseline performance conditions of each technology were estimated based on best available knowledge of current market conditions and technology applications. Resources used for the estimation of both baseline and energy efficiency technology performance and cost included (i) the California Database of Energy Efficiency Resources ("DEER"); (ii) detailed engineering modeling and simulation specific to the region; (iii) data from recognized industry resources such as the Consortium of Energy Efficiency ("CEE") and American Society of Heating Refrigeration and Air Conditioning Engineers ("ASHRAE"); (iv) manufacturers data; and (v) data accumulated from similar analysis for other regional utilities.

Application and cost basis designators were used to determine which cost elements are used for each measure. The application designation is important because it helps to define what type of cost estimate is needed by identifying the types of projects where the measure is expected to be applied. There are three application codes that have been used:

- **Retrofit ("RET")** – Replacing a working system with a new technology before the end of its useful life, or installing a technology that was not there before. The cost basis for this application is typically installed cost;
- **Replace-on-burnout ("ROB")** – Replacing a technology at the end of its useful life. The cost basis for this application is typically the incremental cost of a more efficient technology compared to a less efficient baseline technology; and
- **New construction ("NEW")** – Installing a technology in a new construction or major renovation project. The cost basis for this application is also typically the incremental cost of a more efficient technology compared to a less efficient baseline technology.

The cost basis designator is used for each measure to determine if the appropriate cost is the incremental or installed cost. The cost basis is determined by: (a) the application (RET, ROB, or NEW) and (b)

C&I Facilities Gas Efficiency Program

whether it is displacing an existing technology, installed in the absence of an existing technology, or is an alternative to a competing technology. The cost basis designation is used to define whether the cost is:

- **Incremental** – the differential cost between a base technology and an energy-efficient technology; or
- **Installed** – the full or installed cost of the measure including equipment, labor, overhead & profit (“OH&P”).

Products and Services Provided

The C&I Facilities Gas Efficiency Program is a customer incentive program design that provides rebates for the installation of energy efficiency measures in existing non-residential facilities. More specifically, the program offers the following products and services:

- Consumer education and promotion designed to assist facility operators and decision makers with the information necessary to improve the energy efficiency of gas-fueled space heating, service and domestic water heating, and commercial cooking systems;
- Education and promotional efforts for customers and trade allies on how the program functions, what energy efficiency technologies are offered, what incentives are provided and the benefits of the measures; and
- Prescriptive incentives to encourage the adoption energy efficiency measures. Prescriptive measures and incentives provided by the program are included in the tables below.

Table 1 provides average incentives per unit and unit definition. These are expected incentive levels based on market participation. Specific incentive levels for certain items where a variety of configurations are possible can be found in the measure analysis worksheets.

Table 1. Prescriptive Incentives

Measure Description	Average Unit Incentive (\$)**	Unit Definition***
Space Heating and Water Heating Measures		
High-efficiency Furnaces	\$200	90 AFUE or better furnace
High-efficiency Space Heating or Process Boilers*	\$250	85.6% efficient or better boiler
Packaged Air Conditioners with High-efficiency Furnaces	\$606	90 AFUE or better furnace with CEE Tier 1 or 2 AC rating
Energy-efficient Storage Water Heaters	\$159	64.0% efficient or better tank type water heater
Commercial Food Service Measures		
High-efficiency Fryers	\$350	42.0% efficient or better open or pressure fryer
High-efficiency Griddles	\$300	45.0% efficient or better griddle
High-efficiency Ovens	\$478	45.0% efficient or better combination, deck,

C&I Facilities Gas Efficiency Program

Measure Description	Average Unit Incentive (\$)**	Unit Definition***
		convection, or conveyor oven
<p>* The high-efficiency boilers measure applies to both space heating and service water heating applications.</p> <p>**Incentives will vary depending on unit heating capacity and efficiency</p> <p>***Efficiencies will vary depending on specific machine type or configuration</p>		

Program Delivery Strategy

The C&I Facilities Gas Efficiency Program will be implemented by employing the services of a qualified implementation contractor. The implementation contractor will be sought through a competitive bidding process which will require UNSG to issue an RFP to professional services companies who are active in the field of DSM program implementation. UNSG will assign an in-house program manager to oversee the activities of the implementation contractor, provide guidance on program activities that is consistent with UNSG's goals and customer service requirements, provide an important contact point for customers who are interested in or have concerns about the program, and provide overall quality control and management of the delivery process.

The implementation contractor will provide program administration, application and incentive processing, participation tracking and reporting, project quality control, and technical support. In addition to the implementation contractor, key partnering relationships include: the local architectural and engineering community; electrical, mechanical and building contractors; equipment manufacturers, distributors and vendors; professional and trade service associations; and the Arizona Energy Office. As part of the implementation plan, UNSG will conduct outreach to each of these partner groups, and provide education and training on the benefits and functioning of the program.

Program Marketing and Communications Strategy

The marketing and communications strategy will be designed to inform customers of the availability and benefits of the program and how they can participate in the program. The strategy will include outreach to key partners and trade allies including the architecture/engineering and contractor community, relevant professional and trade associations and other parties of interest in the market. An important part of the marketing plan will be content and functionality on the UNSG website, which will direct customers to information about the program. More specifically, the marketing and communications plan will include:

- Education seminars implemented in each market to provide details about how to participate in the program. The seminars will be tailored to the needs of business owners, building managers, architects, engineers, vendors, and contractors;

C&I Facilities Gas Efficiency Program

- A combination of strategies including major media advertising, outreach and presentations at professional and community forums and events, and through direct outreach to key customers and customer representatives. Marketing activities will include:
 - Brochures that describe the benefits and features of the program including program application forms and worksheets. The brochures will be mailed upon demand and distributed through the call center and the UNSG website and will be available for various public awareness events (school training, presentations, seminars etc);
 - Targeted mailing used to educate customers on the benefits of the program and explain how they can apply;
 - Customer and trade partner outreach and presentations (e.g., school associations, BOMA, ASHRAE) informing interested parties about the benefits of the program and how to participate;
 - Print advertisements to promote the program placed in selected local media including the newspapers and trade publications in the UNSG service territory;
 - Website content providing program information resources, contact information, downloadable application forms and worksheets, and links to other relevant service and information resources;
 - UNSG customer care representatives trained to answer any customer questions regarding the program;
 - Presence at conferences and public events used to increase general awareness of the program and distribute program promotional materials; and
 - Presentations by the program manager to key customers and customer groups to actively solicit their participation in the program.
- The marketing strategy will identify key customer segments and groups for target marketing including the school districts, commercial kitchens and laundromats and prepare specific outreach activities for these customers;
- UNSG will design and develop the content, messaging, branding, and calls to action of all of the marketing and collateral materials used to promote the program; and
- The implementation contractor will be responsible for assisting with program promotion including customer contact, attendance at public presentations and events, and will be the primary contact point from the website and other promotional materials.

Program Implementation Schedule

The program implementation schedule is summarized in Table 2.

Table 2. C&I Facilities Gas Efficiency Program Implementation Schedule

Program Activities	2007			2008			2009		
New program submitted to ACC for approval									
New program approval (estimated)									
Implementation contractor RFPs issued									
Implementation contractors selected									
Marketing and communications plan prepared (including collateral materials)									
Implementation plan prepared									
Program kick-off and marketing campaign									

C&I Facilities Gas Efficiency Program	
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Estimated Participation and Demand and Energy Savings

Total annual energy savings goals are presented in Table 3. Appendix 3 provides further information about estimated energy savings for each measure category, including the measure and program level benefit cost analysis. Appendix 3 also provides the expected project technology mix for 2008, which is considered to be the template for all program years.

Table 3. Projected Capacity and Energy Benefits

Annual Incremental Savings	2008	2009	2010	2011	2012
Energy Savings (therms)	286,616	295,214	304,071	313,193	322,588

As a result of the energy savings shown above, it is estimated that the program will produce environmental benefits through avoided emissions of carbon dioxide (CO₂). The estimated avoided emissions from 2008 – 2012 are shown in Table 4:

Table 4. Projected Environmental Benefits, 2008 - 2012

CO2 Emissions Avoided	8,978	Tons
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Program Cost Effectiveness

Table 5 provides a summary of the benefit/cost analysis results for this program according to the TRC, SC and RIM tests. A benefit/cost analysis summary of all measures is presented in Appendix 3.

Table 5. Benefit-cost analysis results

Cost Effectiveness Tests	TRC	SC	RIM
Benefit/Cost Ratio	1.68	2.09	0.52

In addition to estimating the savings from each measure, this analysis relies on a range of other assumptions and financial data provided in Table 6. Because the program consists of a variety of measures, each with a unique avoided cost and economic useful life, these metrics are not provided in Table 6 but can be found in the individual measure analysis worksheets.

C&I Facilities Gas Efficiency Program

Table 6. Other Financial Assumptions

Ratio of Non-inc to Incentive Costs	96.7%
TRC Discount Rate	8.50%
Social Discount Rate	5.00%
Weighted Average NTG Ratio:	77%

Program Costs (Budget)

The average annual budget of approximately \$106,183 will be allocated as shown in Table 7, while Table 8 provides the expected program budgets through 2012. Appendix 2 provides additional details on the 2008 budget.

Table 7. 2008 Program Budget

Total Program Budget	\$100,000
Total Administrative and O&M Cost Allocation	
Managerial & Clerical	\$15,200
Travel & Direct Expenses	\$2,280
Overhead	\$1,520
Total Administrative Cost	\$19,000
Total Marketing Allocation	
Internal Marketing Expense	\$7,500
Subcontracted Marketing Expense	\$7,500
Total Marketing Cost	\$15,000
Total Direct Implementation	
Financial Incentives	\$50,840
Support Activity Labor	\$3,100
Hardware & Materials	\$2,480
Rebate Processing & Inspection	\$5,580
Total Direct Installation Cost	\$62,000
Total EM&V Cost Allocation	
EM&V / Research Activity	\$3,800
EM&V Overhead	\$200
Total EM&V Cost	\$4,000

Table 8. 2008 – 2012 Program Budget

Year	2008	2009	2010	2011	2012
Total Budget	\$100,000	\$103,000	\$106,090	\$109,273	\$112,551
Incentives	\$50,840	\$52,365	\$53,936	\$55,554	\$57,221
Administrative Costs	\$49,160	\$50,635	\$52,154	\$53,718	\$55,330
Incentives as % of Budget	50.8%	50.8%	50.8%	50.8%	50.8%

Measurement, Evaluation, and Research

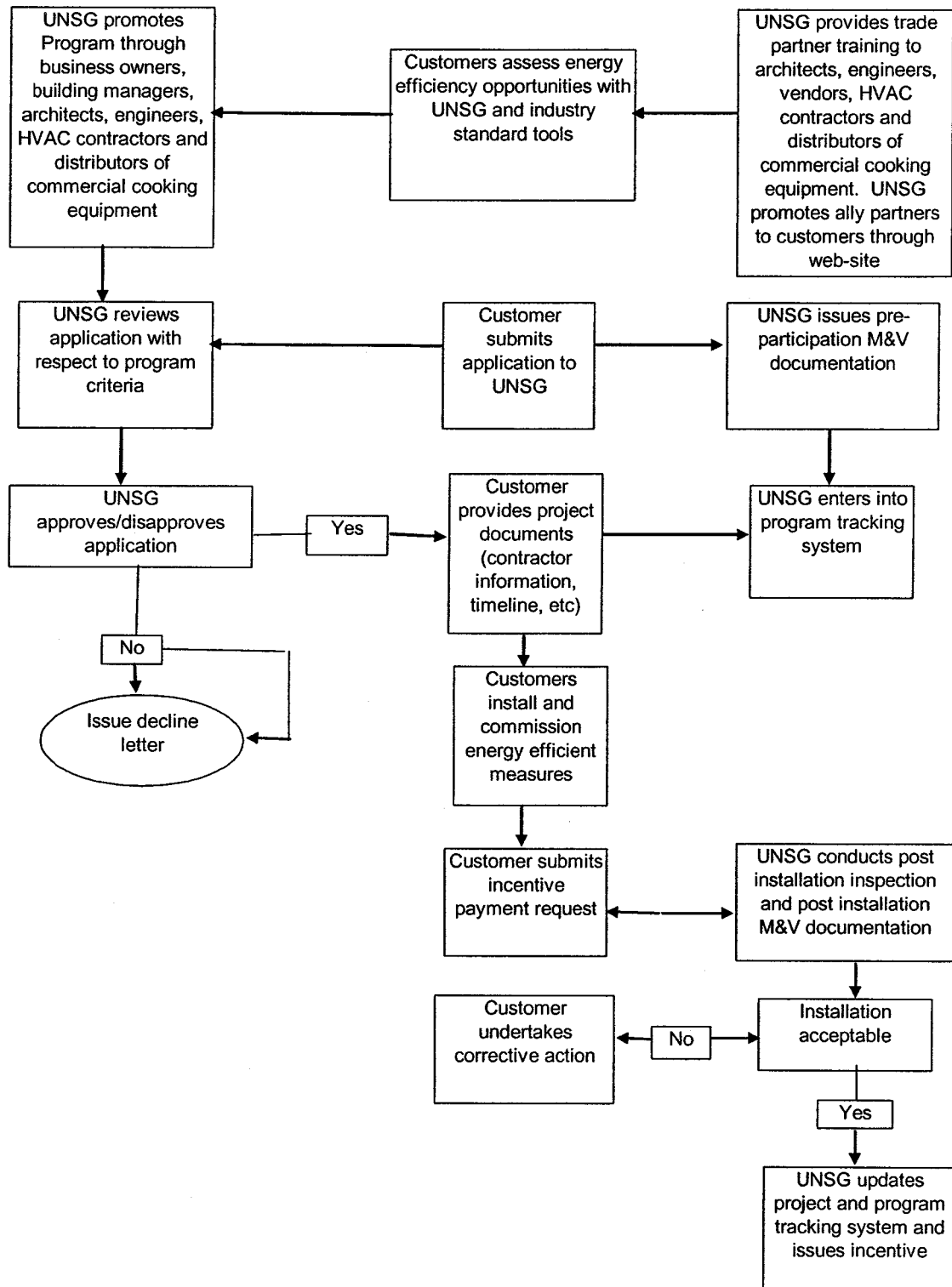
UNSG will adopt a strategy that calls for integrated data collection that is designed to provide a quality data resource for program tracking, management and evaluation. This approach will entail the following primary activities:

- **Database tracking system development.** As part of detailed program design, UNSG will develop a database tracking system that will be used to collect the necessary data elements and provide the reporting functions needed to track program process and provide a data resource for program evaluation.
- **Integrated implementation data collection.** UNSG will work with the implementation contractor to establish systems to collect the data needed to support effective program management and evaluation through the implementation and customer application processes. The database tracking system will be integrated with implementation data collection processes.
- **Field verification.** UNSG will conduct field verification of the installation of a sample of measures throughout the implementation of the program.
- **Tracking of savings using deemed savings values.** UNSG will develop deemed savings values for each measure and technology promoted by the program and periodically review and revise the savings values to be consistent with program participation and accurately estimated the savings being achieved by the program.

This approach will provide UNSG with ongoing feedback on program progress and enable program management to adjust or correct the program so as to be more effective, provide a higher level of service, and be more cost beneficial. Integrated data collection will also provide a high quality data resource for evaluation activities.

C&I Facilities Gas Efficiency Program

Appendix 1 – C&I Facilities Gas Efficiency Implementation Process



C&I Facilities Gas Efficiency Program

Appendix 2 – Expected 2008 Program Costs

Budget Items	Budget	Allocation Rate (%)
Administrative		
Managerial and Clerical Labor	\$15,200	
Labor - Clerical	\$760	5.0%
Labor - Program Design	\$760	5.0%
Labor - Program Development	\$760	5.0%
Labor - Program Planning	\$2,280	15.0%
Labor - Program/Project Management	\$1,520	10.0%
Labor - Staff Management	\$1,520	10.0%
Labor - Staff Supervision	\$760	5.0%
Subcontractor Labor - Clerical	\$760	5.0%
Subcontractor Labor - Program Design	\$1,520	10.0%
Subcontractor Labor - Program Development	\$760	5.0%
Subcontractor Labor - Program Planning	\$760	5.0%
Subcontractor Labor - Program/Project Management	\$3,040	20.0%
Subcontractor Labor - Staff Management	\$0	0.0%
Subcontractor Labor - Staff Supervision	\$0	0.0%
<i>Subtotal Managerial and Clerical Labor</i>	<i>\$15,200</i>	<i>100.0%</i>
Travel & Direct Expenses	\$2,280	
Conference Fees	\$228	10.0%
Labor - Conference Attendance	\$228	10.0%
Subcontractor - Conference Fees	\$46	2.0%
Subcontractor - Travel - Airfare	\$91	4.0%
Subcontractor - Travel - Lodging	\$46	2.0%
Subcontractor - Travel - Meals	\$46	2.0%
Subcontractor - Travel - Mileage	\$46	2.0%
Subcontractor - Travel - Parking	\$46	2.0%
Subcontractor - Travel - Per Diem for Misc. Expenses	\$205	9.0%
Subcontractor Labor - Conference Attendance	\$46	2.0%
Travel - Airfare	\$319	14.0%
Travel - Lodging	\$228	10.0%
Travel - Meals	\$114	5.0%
Travel - Mileage	\$114	5.0%
Travel - Parking	\$68	3.0%
Travel - Per Diem for Misc. Expenses	\$410	18.0%
<i>Travel & Direct Expenses</i>	<i>\$2,280</i>	<i>100.0%</i>
Overhead (General and Administrative) - Labor and Materials	\$1,520	
Equipment - Communications	\$30	2.0%
Equipment - Computing	\$30	2.0%
Equipment - Document Reproduction	\$30	2.0%
Equipment - General Office	\$30	2.0%
Equipment - Transportation	\$30	2.0%
Facilities - Lease/Rent Payment	\$0	0.0%
Labor - Accounts Payable	\$15	1.0%
Labor - Accounts Receivable	\$15	1.0%

C&I Facilities Gas Efficiency Program

Labor - Administrative	\$15	1.0%
Labor - Automated Systems	\$0	0.0%
Labor - Communications	\$15	1.0%
Labor - Contract Reporting	\$15	1.0%
Labor - Corporate Services	\$15	1.0%
Labor - Facilities Maintenance	\$15	1.0%
Labor - Information Technology	\$15	1.0%
Labor - Materials Management	\$15	1.0%
Labor - Procurement	\$15	1.0%
Labor - Regulatory Reporting	\$608	40.0%
Labor - Shop Services	\$15	1.0%
Labor - Telecommunications	\$15	1.0%
Labor - Transportation Services	\$15	1.0%
Office Supplies	\$15	1.0%
Postage	\$15	1.0%
Subcontractor - Equipment - Communications	\$0	0.0%
Subcontractor - Equipment - Computing	\$0	0.0%
Subcontractor - Equipment - Document Reproduction	\$0	0.0%
Subcontractor - Equipment - General Office	\$0	0.0%
Subcontractor - Equipment - Transportation	\$0	0.0%
Subcontractor - Facilities - Lease/Rent Payment	\$0	0.0%
Subcontractor - Office Supplies	\$0	0.0%
Subcontractor - Postage	\$0	0.0%
Subcontractor Labor - Accounts Payable	\$0	0.0%
Subcontractor Labor - Accounts Receivable	\$0	0.0%
Subcontractor Labor - Administrative	\$0	0.0%
Subcontractor Labor - Automated Systems	\$0	0.0%
Subcontractor Labor - Communications	\$0	0.0%
Subcontractor Labor - Contract Reporting	\$0	0.0%
Subcontractor Labor - Corporate Services	\$0	0.0%
Subcontractor Labor - Facilities Maintenance	\$0	0.0%
Subcontractor Labor - Information Technology	\$0	0.0%
Subcontractor Labor - Materials Management	\$0	0.0%
Subcontractor Labor - Procurement	\$0	0.0%
Subcontractor Labor - Regulatory Reporting	\$532	35.0%
Subcontractor Labor - Shop Services	\$0	0.0%
Subcontractor Labor - Telecommunications	\$0	0.0%
Subcontractor Labor - Transportation Services	\$0	0.0%
Subtotal Overhead	\$1,520	100.0%
Total Administrative Costs	\$19,000	
Marketing/Advertising/Outreach		
Internal Marketing Expense	\$7,500	
Advertisements / Media Promotions	\$1,875	25.0%
Bill Inserts	\$300	4.0%
Brochures	\$450	6.0%
Door Hangers	\$0	0.0%
Labor - Business Outreach	\$375	5.0%
Labor - Customer Outreach	\$375	5.0%

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Labor - Customer Relations	\$375	5.0%
Labor - Marketing	\$2,250	30.0%
Print Advertisements	\$1,125	15.0%
Radio Spots	\$375	5.0%
<i>Subtotal Internal Marketing Expense</i>	<i>\$7,500</i>	<i>100.0%</i>
Subcontracted Marketing Expense	\$7,500	
Subcontractor - Bill Inserts	\$375	5.0%
Subcontractor - Brochures	\$375	5.0%
Subcontractor - Door Hangers	\$0	0.0%
Subcontractor - Print Advertisements	\$0	0.0%
Subcontractor - Radio Spots	\$750	10.0%
Subcontractor - Television Spots	\$0	0.0%
Subcontractor Labor - Business Outreach	\$375	5.0%
Subcontractor Labor - Customer Outreach	\$375	5.0%
Subcontractor Labor - Customer Relations	\$375	5.0%
Subcontractor Labor - Marketing	\$375	5.0%
Television Spots	\$0	0.0%
Website Development	\$4,500	60.0%
<i>Subtotal Subcontracted Marketing Expense</i>	<i>\$7,500</i>	<i>100.0%</i>
Total Marketing/Advertising/Outreach	\$15,000	
Direct Implementation		
Financial Incentives to Customers	\$50,840	
Activity - Labor	\$3,100	
Labor - Curriculum Development	\$248	8.0%
Labor - Customer Education and Training	\$1,240	40.0%
Labor - Customer Equipment Testing and Diagnostics	\$0	0.0%
Labor - Facilities Audits	\$930	30.0%
Subcontractor Labor - Facilities Audits	\$310	10.0%
Subcontractor Labor - Curriculum Development	\$155	5.0%
Subcontractor Labor - Customer Education and Training	\$155	5.0%
Subcontractor Labor - Customer Equipment Testing and Diagnostics	\$62	2.0%
<i>Subtotal Activity</i>	<i>\$3,100</i>	<i>100.0%</i>
Hardware and Materials - Installation and Other DI Activity	\$2,480	
Audit Applications and Forms	\$198	8.0%
Direct Implementation Literature	\$496	20.0%
Education Materials	\$496	20.0%
Energy Measurement Tools	\$248	10.0%
Installation Hardware	\$248	10.0%
Subcontractor - Direct Implementation Literature	\$99	4.0%
Subcontractor - Education Materials	\$99	4.0%
Subcontractor - Energy Measurement Tools	\$397	16.0%
Subcontractor - Installation Hardware	\$149	6.0%
Subcontractor - Audit Applications and Forms	\$50	2.0%
<i>Subtotal Hardware and Materials</i>	<i>\$2,480</i>	<i>100.0%</i>
Rebate Processing and Inspection - Labor and Materials	\$5,580	
Labor - Field Verification	\$558	10.0%
Labor - Rebate Processing	\$0	0.0%
Labor - Site Inspections	\$558	10.0%

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Rebate Applications	\$0	0.0%
Subcontractor - Rebate Applications	\$558	10.0%
Subcontractor Labor - Field Verification	\$1,116	20.0%
Subcontractor Labor - Rebate Processing	\$1,674	30.0%
Subcontractor Labor - Site Inspections	\$1,116	20.0%
<i>Subtotal Rebate Processing and Inspection</i>	<i>\$5,580</i>	<i>100.0%</i>
Total Direct Implementation	\$62,000	
Evaluation, Measurement and Verification		
EM&V Labor and Materials	\$3,800	
Labor - EM&V	\$190	5.0%
Materials - EM&V	\$190	5.0%
Subcontractor Labor - EM&V	\$3,420	90.0%
<i>Subtotal EM&V Activity - Labor</i>	<i>\$3,800</i>	<i>100.0%</i>
EM&V Overhead	\$200	
Benefits - EM&V Labor	\$0	0.0%
Overhead - EM&V	\$100	50.0%
Subcontractor Overhead - EM&V	\$0	0.0%
Subcontractor Travel - EM&V	\$0	0.0%
Travel - EM&V	\$100	50.0%
<i>Subtotal EM&V Overhead</i>	<i>\$200</i>	<i>100.0%</i>
Total EM&V	\$4,000	
Total Budget	\$100,000	

C&I Facilities Gas Efficiency Program

Appendix 3 – Measure Level Energy Savings and Benefit/Cost Analysis

See accompanying Excel spreadsheet for program additional benefit/cost calculations

GCC100 - HIGH-EFFICIENCY GAS FRYER

PROGRAM DATA										RATE DATA		OTHER FACTORS								
Conservation Life (yrs):										Rate:	1.29355	Application	ROB							
Program Life (yrs):																				
Levelized Terms										\$/Therm		Cost Basis:								
Ratio of Non-inc to Incentive Costs										0.90297		Incremental equipment								
IRP Discount Rate*****:										96.7%										
Social Discount Rate										8.50%										
NTG Ratio:										5.00%										
										96%										
DEMAND/ENERGY SAVINGS										INCENTIVE CALCULATIONS					CUSTOMER COST/SAVINGS			WGT.	% Incent	TRC
Measure Type	Size (lbs oil)	Base Annual Usage (kBtu/h)	Base Eff.	High Eff.	Annual Savgs. Per Unit (Therms)	IRP PV Benefit (\$)	Social PV Benefit (\$)	Recommended Incentive		PV Program Cost (\$)	NPV (\$)	Incr. Cost Savings (\$)	Cost w/Inc. (\$)	Payback w/Inc. (yrs)	Weighting Factor	BC Ratio				
								(\$)	% PV											
High Efficiency - Open Deep Fat	15 - 39	60,000	0.30	0.57	284	\$1,810	\$2,184	\$300	17%	\$740	\$1,069	\$469	\$368	1.3	0.5	0.20	64%	2.45		
High Efficiency - Open Deep Fat	40 - 59	100,000	0.30	0.57	474	\$3,016	\$3,639	\$350	12%	\$846	\$2,169	\$529	\$613	0.9	0.3	0.50	66%	3.56		
High Efficiency - Open Deep Fat	60+	135,000	0.30	0.57	639	\$4,071	\$4,913	\$400	10%	\$1,031	\$3,040	\$671	\$827	0.8	0.3	0.20	60%	3.95		
High Efficiency - Pressure	15 - 39	45,000	0.30	0.43	132	\$843	\$1,017	\$300	36%	\$740	\$103	\$469	\$171	2.7	1.0	0.02	64%	1.14		
High Efficiency - Pressure	40 - 59	75,000	0.30	0.43	221	\$1,404	\$1,695	\$350	25%	\$846	\$558	\$529	\$285	1.9	0.6	0.07	66%	1.66		
High Efficiency - Pressure	60+	125,000	0.30	0.43	368	\$2,341	\$2,825	\$400	17%	\$1,031	\$1,310	\$671	\$476	1.4	0.6	0.01	60%	2.27		
Weighted Average					443.34	\$2,823	\$3,406	\$350	14%	\$862	\$1,961	\$546	\$573	1.0	0.37	1.00	64%	3.28		
***** See worksheet 'Cost Assumptions' for information of cost data.																				
***** Discount rate is based on TEP estimate 12/31/2006																				

C&I Facilities Gas Efficiency Program

GCC200 - HIGH-EFFICIENCY GAS GRIDDLE

Gas C&I																		
PROGRAM DATA				RATE DATA		OTHER FACTORS												
Conservation Life (yrs):				12	Rate:		Application		ROB									
Program Life (yrs):				5	\$/Therm		Cost Basis:		Incremental equipment									
Levelized Therms				0.90297														
Ratio of Non-inc to Incentive Costs				96.7%														
IRP Discount Rate*****:				8.50%														
Social Discount Rate				5.00%														
NTG Ratio:				96%														
DEMAND/ENERGY SAVINGS																		
INCENTIVE CALCULATIONS					CUSTOMER COST/SAVINGS			WGT.	% Incent	TRC								
Measure Type	Size (kBtu/h)	Base Annual Usage (kBtu/h)	Base Eff.	Annual Savgs. High Per Unit Eff. (Therms)	IRP PV Benefit (\$)	Social PV Benefit (\$)	Recommended Incentive (\$)	% PV	Program Cost NPV (\$)	Incr. Cost Savings (\$)	Cost w/inc. (yrs)	Payback w/inc. (yrs)	Weighting Factor (%)	BC Ratio				
High Efficiency - Gas Griddle	60 - 80	86,100	0.30	0.45	287	\$1,827	\$2,205	\$300	16%	\$714	\$1,114	\$441	\$371	1.2	0.4	1.00	68%	2.56
Weighted Average					287.00	\$1,827	\$2,205	\$300	16%	\$714	\$1,114	\$441	\$371	1.19	0.38	1.00	68%	2.56
**** See worksheet 'Cost Assumptions' for information of cost data.																		

C&I Facilities Gas Efficiency Program

GCC300 - HIGH-EFFICIENCY GAS OVENS

Gas C&I																	
PROGRAM DATA				RATE DATA			OTHER FACTORS										
Conservation Life (yrs):				12			Rate:			1.29355			Application		ROB		
Program Life (yrs):				5			Rate:			1.29355			Cost Basis:		Incremental equipment		
Levelized Therms				0.90297													
Ratio of Non-inc to Incentive Costs				96.7%													
IRP Discount Rate****:				8.50%													
Social Discount Rate				5.00%													
NTG Ratio:				96%													
DEMAND/ENERGY SAVINGS				INCENTIVE CALCULATIONS							CUSTOMER COST/SAVINGS				WGT.	% Incent.	TRC
Measure Type	Size (kbluh)	Base Annual Usage (kBtu)	Base Eff.	High Eff. (Therms)	Annual Savgs.	IRP PV Benefit (\$)	Social PV Benefit (\$)	Recommended Incentive		NPV (\$)	Incr. Cost (\$)	Cost Savings (\$)	Payback w/Inc. (yrs)	w/Inc. (yrs)	Weighting Factor	BC Ratio	
								(\$)	% PV								
High Efficiency Combination Oven	70	115,000	0.30	0.50	460	\$2,929	\$3,534	\$750	26%	\$615	\$1,655	\$595	2.8	1.5	0.05	45%	1.27
High Efficiency Convection Oven	70	60,000	0.25	0.50	300	\$1,910	\$2,305	\$400	21%	\$915	\$633	\$388	1.6	0.6	0.20	63%	1.92
High Efficiency Conveyor Oven	135	210,000	0.15	0.45	1400	\$8,913	\$10,756	\$1,000	11%	\$3,247	\$2,375	\$1,811	1.3	0.8	0.10	42%	2.75
High Efficiency Deck Oven	70	65,000	0.25	0.50	325	\$2,069	\$2,497	\$400	19%	\$1,122	\$766	\$420	1.8	0.9	0.65	52%	1.84
Weighted Average					434.25	\$2,765	\$3,336	\$478	19%	\$1,369	\$945	\$562	1.78	0.84	1.00	51%	2.02
**** See worksheet 'Cost Assumptions' for information of cost data.																	
***** Discount rate is based on TEP estimate 12/31/2006																	

C&I Facilities Gas Efficiency Program

Gas C&I

**** See worksheet 'Cost Assumptions' for information of cost data.

C&I Facilities Gas Efficiency Program

GHV200 • ENERGY-EFFICIENT PACKAGED HEAT AND AIR CONDITIONERS – NON RESIDENTIAL

[illegible]

C&I Facilities Gas Efficiency Program

GHV300 - HIGH-EFFICIENCY SPACE HEATING/ PROCESS HOT WATER BOILERS

PROGRAM DATA		OPERATING DATA		OTHER FACTORS	
Conservation Life (yrs):	20	Htg. Season Hrs.:	2460	Application	ROB
Program Life (yrs):	5	Htg. Season Load Factor:	1	Cost Basis:	Incremental equipment
Levelized Terms	0.94510				
Ratio of Non-inc to Incentive Costs	96.7%				
IRP Discount Rate****:	8.50%				
Social Discount Rate	5.00%				
NTG Ratio:	70%				

RATE DATA	
Rate:	1.29355
\$/Therm	

DEMAND/ENERGY SAVINGS			INCENTIVE CALCULATIONS			CUSTOMER COST/SAVINGS			WGT.	% Incent	TRC						
Measure Type	ASHRAE Size (kBtu/h Input)	ASHRAE Base Eff	Sample Planning Eff	Base Load (Btu/h)	Annual Savgs. Per Unit (Therms)	IRP PV Benefit (\$)	Social PV Benefit (\$)	Recommended Incentive (\$)	% PV	PV Program Cost (\$)	NPV (\$)	Incr. Cost (\$)	Cost Savings (\$)	Payback w/Incr. (yrs)	Payback w/Inc. (yrs)	Weighting Factor	BC Ratio
Small condensing boiler	<300	0.80	0.856	100,000	201.4	\$1,261	\$1,660	\$250	20%	\$836	\$425	\$849	\$260	3.3	2.3	0.50	1.51
Medium - Large condensing boiler	>300	0.80	0.857	100,000	208.0	\$1,290	\$1,698	\$250	19%	\$491	\$798	\$357	\$266	1.3	0.4	0.50	2.62
Weighted Average					203.67	\$1,275	\$1,679	\$250	\$0	\$664	\$611	\$603	\$263	2.30	1.35	1.00	1.92

Htg Season Hrs based on Kingman at 3212 HDD

**** See worksheet 'Cost Assumptions' for information of cost data.

***** Discount rate is based on TEP estimate 12/31/2006

C&I Facilities Gas Efficiency Program

Gas C&I

PROGRAM DATA				RATE DATA		OPERATING DATA		OTHER FACTORS								
Conservation Life (yrs):	15	Rate:	\$/Therm	1.29355	Op. Days/Year:	Office	255	Application	ROB							
Program Life (yrs):	5					School	200	Cost Basis:	Incremental equipment							
Levelized Therms	0.91841					Hotel	365									
Ratio of Non-Inc to Incentive Costs	96.7%					Health	365									
IRP Discount Rate****:	8.50%					Food Service	312									
Social Discount Rate	5.00%						100									
NTG Ratio:	70%															
DEMAND/ENERGY SAVINGS				INCENTIVE CALCULATIONS				CUSTOMER COST/SAVINGS			WG.T.	% Incent.	TRC			
Measure Type	Building Size	Common Unit (Sq Ft)	Savings/ Common Unit (kBtu)	Savings/ Common Unit (Therms)	Number Common Unit	Annual Savings (Therms)	IRP PV Benefit (\$)	Social PV Benefit (\$)	Recommended Incentive (\$)	% PV	NPV Cost (\$)	Program Cost (\$)	Incr. Cost Savings (\$)	Cost Payback w/Inc. (yrs)	Weighting Factor	BC Ratio (%)
Education - Primary School	50000	1,000	234	2.3	50	117	\$626	\$783	\$200	32%	\$216	\$410	\$310	2.0	0.7	0.14
Education - Secondary School	150000	1,000	109	1.1	150	164	\$877	\$1,096	\$200	23%	\$466	\$410	\$310	1.5	0.5	0.14
Grocery	50000	1,000	70	0.7	50	35	\$186	\$232	\$200	108%	-\$224	\$410	\$310	6.9	2.4	0.14
Lodging - Motel	30000	1,000	876	8.8	30	263	\$1,405	\$1,756	\$200	14%	\$995	\$410	\$310	0.9	0.3	0.14
Office - Small	10000	1,000	104	1.0	10	10	\$55	\$69	\$200	361%	-\$355	\$410	\$310	23.1	8.2	0.14
Restaurant - Fast Food	2000	1,000	6752	67.5	2	135	\$722	\$902	\$200	28%	\$311	\$410	\$310	1.8	0.6	0.14
Restaurant - Sit Down	4000	1,000	11949	118.5	4	474	\$2,533	\$3,166	\$200	8%	\$2,123	\$410	\$310	0.5	0.2	0.14
Weighted Average						171	\$915	\$1,143	\$200	\$1	\$505	\$410	\$310	5.24	1.86	1.00

Expected Annual Project Mix

Energy Efficiency Measure	Annual Units	% Therm Savings
High Efficiency Gas Fryer	23	3.6%
High Efficiency Gas Griddle	27	2.7%
High Efficiency Gas Ovens	34	5.1%
Packaged system with 90 AFUE+ furnace	156	15.6%
Energy Efficient Space Heating / Process Hot Water Boiler	32	2.3%
Energy Efficient Service Water Hot Water Heater	135	8.1%
High efficiency furnace 90 AFUE +	679	62.6%